the OIL AND GAS JOURNAL

STRENGTH • FLEXIBILITY • WEAR RESISTANCE

YELLOW STRAND® OFFERS ALL THREE TO OILFIELD USERS

• In drilling lines or any other oilfield use of wire rope, it takes a balanced combination—of strength, flexibility and wear resistance—for longer, trouble-free service.

• *Yellow Strand* has strength for many more round trips—from higher quality materials manufactured specifically for wire rope production. *Yellow Strand* has flexibility for faster rigging—from engineered design and precision care in construction. *Yellow Strand* has wear resistance—each wire, each strand is thoroughly lubricated for corrosive protection and friction reduction.

• *Yellow Strand* gives you these three important qualities needed for longer life and lower line costs . . . plus a bonus in prompt distributor service and a selection that meets any need. Call your Broderick & Bascom oilfield distributor next time you rig-up, and start saving money with Yellow Strand!

BRODERICK & BASCOM ROPE CO.

SPECIFY *Yellow Strand*®

FOR SAVINGS . . . SAFETY . . . SERVICE

Brantley Drilling Company, Midland, Texas, keeps production rolling with Yellow Strand lines on their rigs. This Emsco GB800 Rig, with A-133 Portable Mast, putting down a 13,000-foot hole in the Denton Field in New Mexico, uses 1¼" 6x19 Preformed Yellow Strand Rotary Line with IWRC.

PRICE 50 CENTS

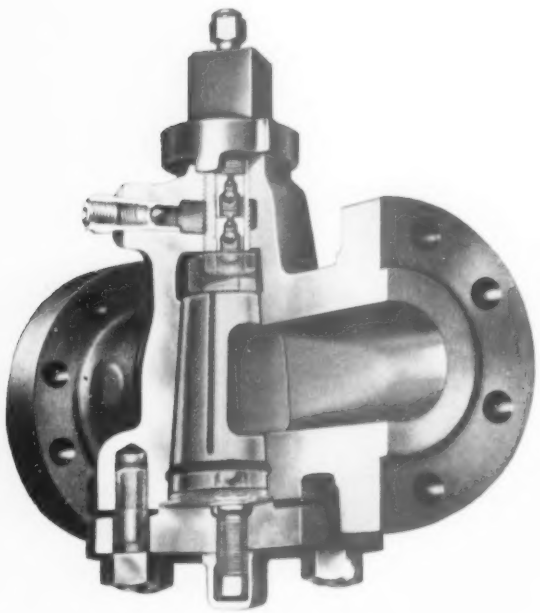
MARCH 8, 1954

What is the advantage of a lubricated valve?

Sometimes the purpose of lubricant in a valve is misunderstood.

The most important function of lubricant in a Nordstrom valve is to give a *tighter seal* than can be accomplished through any other method yet developed. The thin film of plastic lubricant that is forced around the ports of the plug is a *pressure seal* in itself.

Of course, the lubricant has other obvious advantages . . . the same advantages it has in your automobile, or in any other mechanical equipment where metal rubs metal. The lubricant all but eliminates the possibility of galling or seizing, and consequently keeps the valve ready to operate in a hurry. A lubricated Nordstrom valve operates easily even against high line pressures, because the plug turns *within* the line, rather than being forced or wedged *against* it. Since it takes only a quarter turn of the plug to open or close the valve, it operates in seconds instead of minutes.



Cutaway view of Nordstrom Hypreseal valve

HOW A NORDSTROM VALVE WORKS

In a Nordstrom valve, lubricant is forced through a series of grooves surrounding the plug ports. There it acts as an extra seal against the little leaks that become big problems. It is also forced into a lubricant chamber at the small end of the plug where it serves as a hydraulic jack to keep the plug easy to turn. Finally, it *lubricates* . . . that is, it prevents grinding wear, fills tiny imperfections that may develop, and it lets the plug slide without grating.

Don't be misled . . .

Valve lubrication doesn't *cost* money, it *saves* money. Your Nordstrom representative will help you select the right Nordstrom valves for your application. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

ROCKWELL Built

Nordstrom Valves

Lubricant-Sealed for Positive Shut-Off

Another Rockwell Product

the OIL AND GAS JOURNAL

MARCH 8, 1954 VOL. 52 NO. 44

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In Brief . . .

1. AMMONIA EXPANSION . . . Here's a look at Round 2 of the ammonia-expansion program. In the present, postwar, round of expansion, nearly all the new ammonia capacity is based on natural gas. Nitrogen chemicals manufacture has been one of the fastest-growing developments in the petero-chemical industry.

Ten new ammonia plants are scheduled for completion in 1954, eight being based on hydrogen from natural gas. Two more are scheduled for 1955.

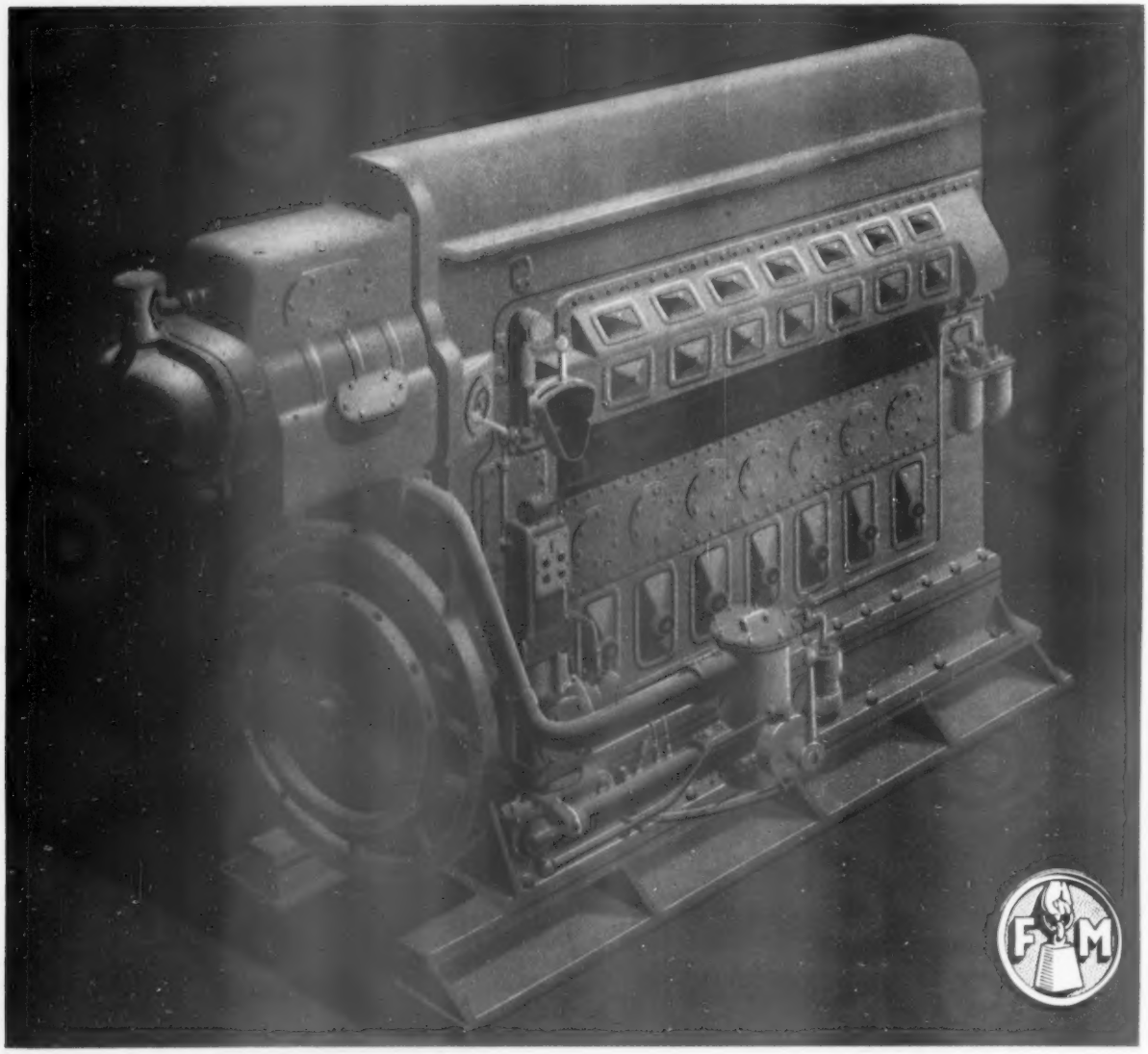
This article by the Journal's petrochemical editor is first in a series designed to present an up-to-date picture of the ammonia program. Articles will include Kellogg-Montecatini, Spencer Vicksburg plant, Foster Wheeler (Texaco-Casale-Pechiney), partial oxidation with air, and others.

One process scheme for the nitrogen products plant, that described in this first article, is (1) steam-methane reforming at elevated pressure (2) near-isothermal ammonia converter and (3) Montecatini urea manufacture.

2. BETTER SERVICE . . . Drilling engines of Parker Drilling Co. are in service without overhaul for as long as 15,000 hours—the equivalent of almost 2 continuous years. After overhaul, these engines are giving service equal to that from new engines. The key to this "use to the utmost" is a day-by-day record of the operating time of every drilling engine, and an overhaul that is minutely complete.

3. PROBLEM SOLVED . . . It is now possible to remove, for all practical purposes, the troublesome pulsation and noise from gas piping without paying a premium in the form of excess pressure drop. This represents a new concept in the design of pulsation dampeners. The concept is practical, economical, and almost unlimited in applications.

4. EFFICIENT OPERATION . . . Two of the most important variables in catalytic cracking are the space velocity and the catalyst-to-oil ratio. The catalyst-to-oil ratio divided by the space velocity is termed the "severity factor." This factor is the major variable controlling the extent of conversion in catalytic cracking. The article takes up (1) weight or volume basis in fluid and moving-bed units; (2) effect of changing space velocity on conversion; (3) effect of changing C/O ratio on coke yield; and (4) severity factor used for correlating severity conditions.



The Fairbanks-Morse Opposed Piston Diesel Model 38F 90. 225 to 750 horsepower. Diesel, Dual Fuel and Spark-ignition options. Other O-P engines available in horsepower ratings to 2400.

Some engines are not good enough

Yes, there are some diesels which just do not have what it takes for the job. They cannot satisfy the owner's pride in smooth, trouble-free operation and are lacking in the ability to square a balance sheet of operational costs and profits. For the more difficult jobs, many engines are simply not good enough.

Maybe you should pay more and get more!

If you want more engine-hours with fewer man-hours, *then* you should have the F-M Opposed Piston Diesel which will cost a little more and give you much, *much* more.

Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the best

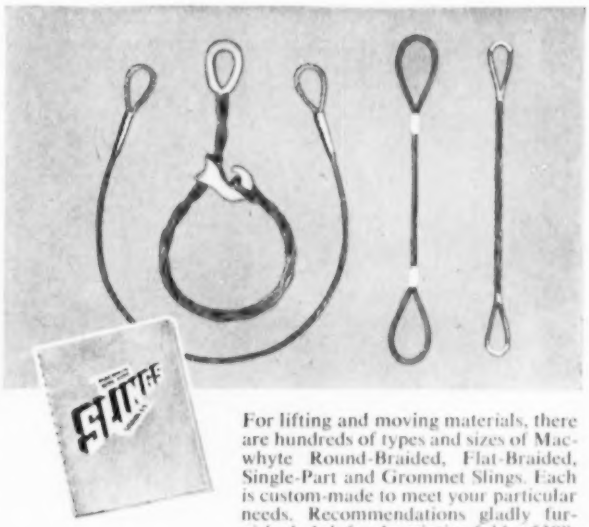
DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

Get long, low-cost service with

MACWHYTE

WIRE ROPE • SLINGS • ASSEMBLIES

In Macwhyte's complete line there are a thousand and one sizes and types of wire rope. Thoroughly lubricated and PREformed—they are engineered to give long, low-cost service on your equipment. Recommendations gladly furnished—ask for Catalog G-15.



For lifting and moving materials, there are hundreds of types and sizes of Macwhyte Round-Braided, Flat-Braided, Single-Part and Grommet Slings. Each is custom-made to meet your particular needs. Recommendations gladly furnished. Ask for descriptive folder 5308.

Macwhyte Safe-Lock Wire Rope Assemblies are made to order in length, strength and flexibility desired. Terminals are permanently attached to one or both ends. Recommendations gladly furnished. Ask for Catalog 5201.

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2916 Fourteenth Avenue
Kenosha, Wisconsin

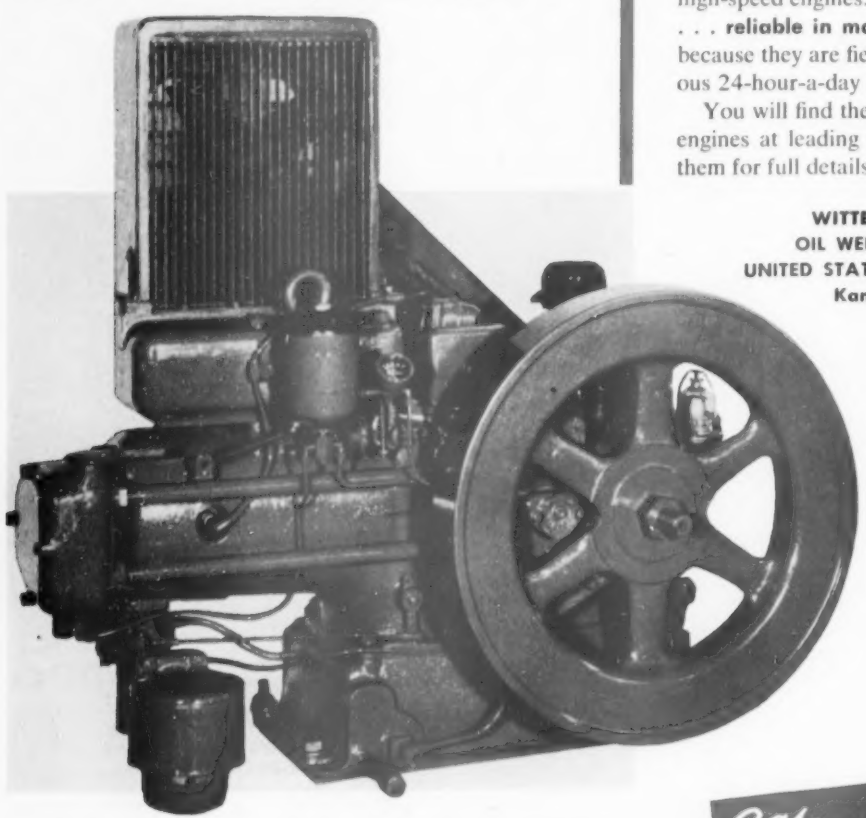
Manufacturers of Internally Lubricated PREformed Wire Rope—Round-Braided and Flat-Braided Wire Rope Slings—Stainless Steel Wire Rope—Monel Metal Wire Rope—Aircraft Cable and Swaged Fittings—Safe-Lock Wire Rope Assemblies.

Mill Depots: New York, Pittsburgh, Chicago, St. Paul, Fort Worth, Portland, Seattle, Los Angeles. Distributors throughout U.S.A.

Looking for economical, 24-hour-a-day pumping power?

Ask your supply store for

WITTE ENGINES!



• When natural gas fuel is available, production men think first of Witte Gas Engines for economical power . . .

. . . **economical in low maintenance costs,** because they are Witte-built single cylinder, condenser cooled engines, with a medium operating speed which assures longer service life as compared to high-speed engines.

. . . **reliable in maintaining pumping schedules,** because they are field proven and built for continuous 24-hour-a-day operation.

You will find the complete line of Witte oil field engines at leading oil field supply stores . . . ask them for full details or write for booklet No. W-21.

WITTE ENGINE WORKS
OIL WELL SUPPLY DIVISION
UNITED STATES STEEL CORPORATION
Kansas City 26, Mo.

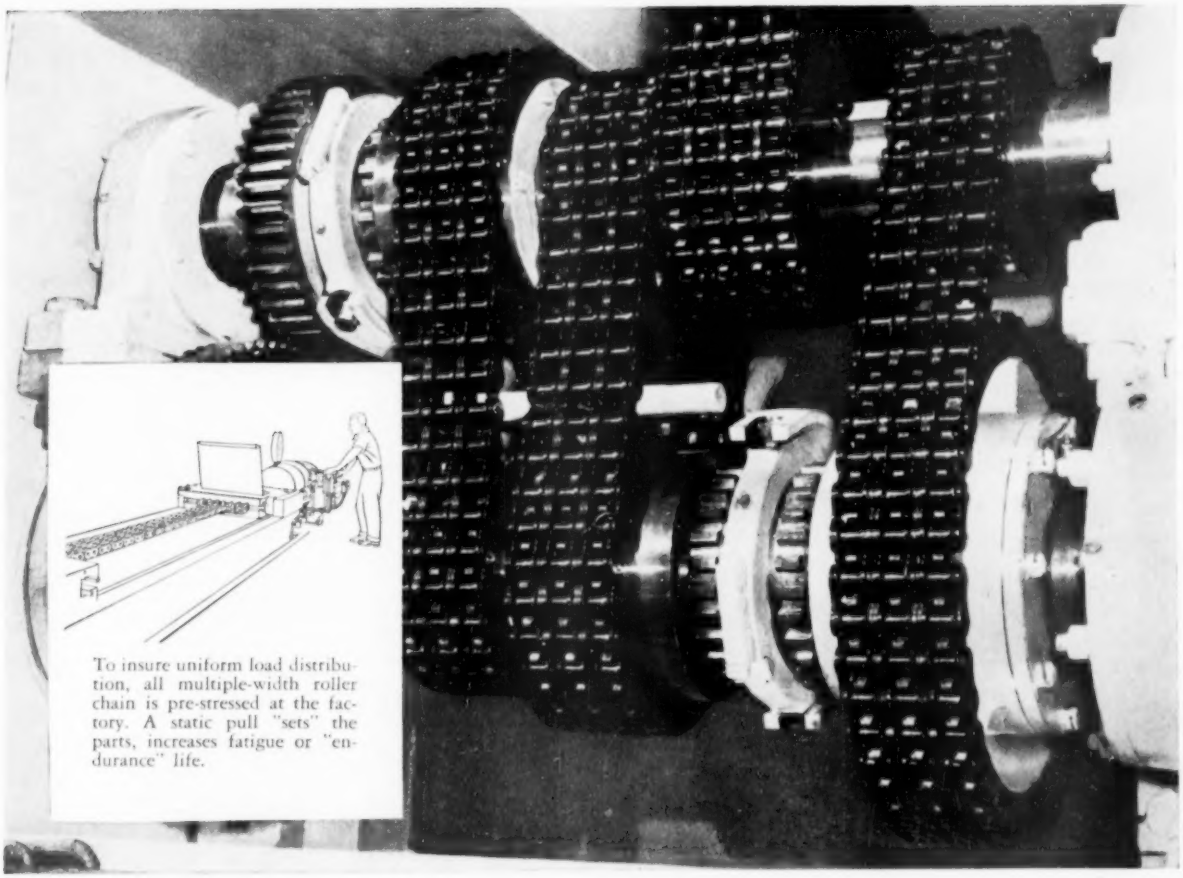
WITTE ENGINES

USS

Gas-gasoline models from 5 to 15.5 hp

Full diesel models from 3.75 to 12.5 hp

UNITED STATES STEEL



To insure uniform load distribution, all multiple-width roller chain is pre-stressed at the factory. A static pull "sets" the parts, increases fatigue or "endurance" life.

Pre-stressing pays off in longer roller chain life!

But it's only one of many engineering extras you get from LINK-BELT

SEVERE requirements of oil field service often result in heavy over-loads. But the pre-stressing of Link-Belt Precision Steel Roller Chain increases its fatigue strength and gives it added ability to absorb these over-loads. This results in longer chain life.

However, the long service record of Link-Belt Precision Steel Roller Chain is based on more than the pre-stressing process. Extra-wear features such as shot-peened rollers and the uniform hardness of parts are further assurance of Link-Belt's *built-in* extra service life.

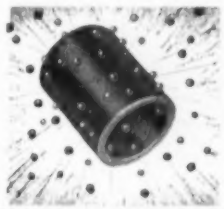
LINK-BELT

ROLLER CHAIN and SPROCKETS

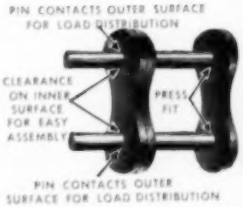
13.448

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 1, Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields.

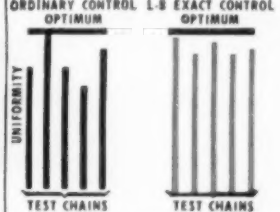
Don't overlook these other LINK-BELT extras



Shot-peened rollers have extra fatigue life under impact.


PIN CONTACTS OUTER SURFACE FOR LOAD DISTRIBUTION
CLEARANCE ON INNER SURFACE FOR EASY ASSEMBLY
PRESS FIT
PIN CONTACTS OUTER SURFACE FOR LOAD DISTRIBUTION

Couple and uncouple multiple-width chains more easily.



Closer heat treat control helps attain greater uniformity.

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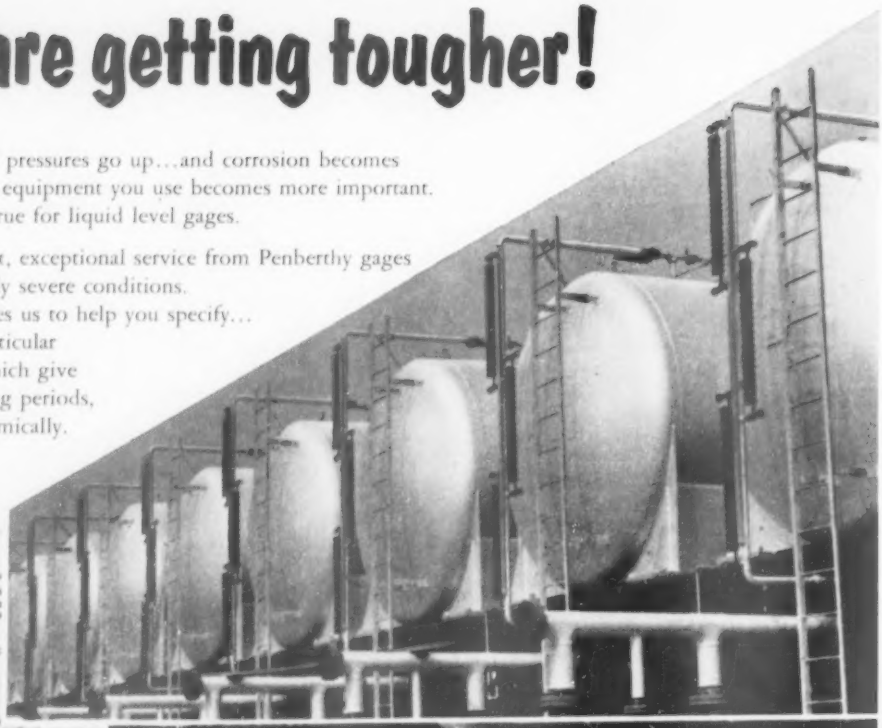
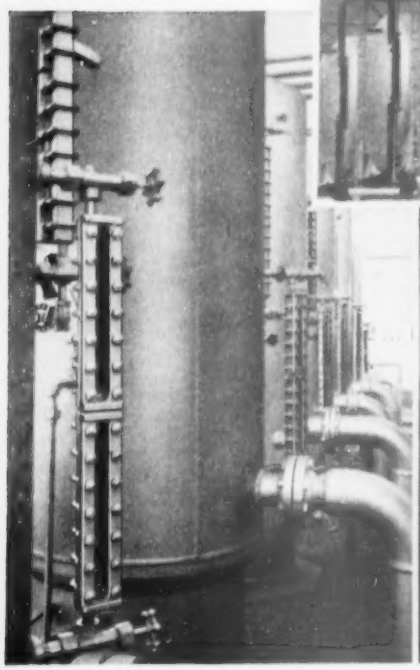
Things are getting tougher!

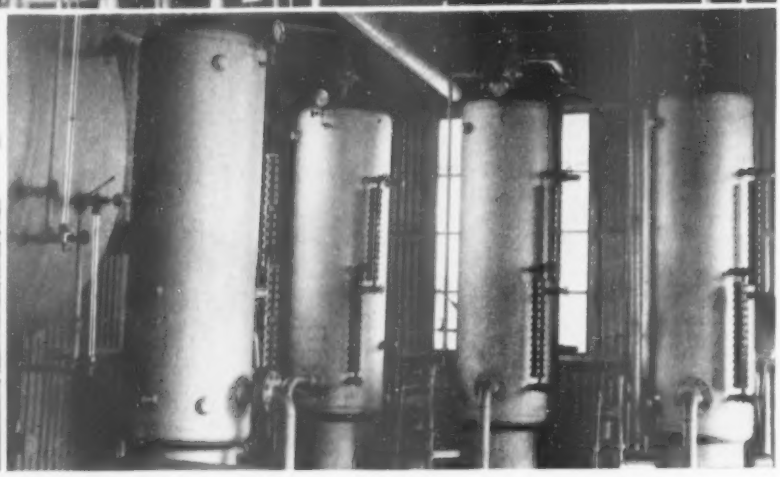
As temperatures and pressures go up...and corrosion becomes more of a problem...the equipment you use becomes more important. That's especially true for liquid level gages.

You can expect, and get, exceptional service from Penberthy gages and valves under increasingly severe conditions.

Our experience enables us to help you specify... or even design to your particular needs...gage sets which give accurate readings for long periods, efficiently and economically.







● *To help you in specifying the right gages for your needs, write for Catalog 35. If your requirements are special, put our engineers to work on them*

PENBERTHY INJECTOR COMPANY
Division of the Buffalo-Eclipse Corporation
1242 Holden Avenue • Detroit 2, Michigan
Established 1866

Penberthy gage sets are made from carbon, chrome-moly and stainless steel as well as Monel metal. They are also available in acid bronze, Everdur, nickel and Hastelloy. All materials conform to or exceed requirements for maximum recommended pressures and temperatures. The finished products are rigidly inspected and tested under actual working conditions.

And, only with Penberthy Gages, do you get such features as the "Floating Shank" which automatically compensates for as much as ⅜" variation in center-to-center distance of the vessel tapping.

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PENBERTHY

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- **SYPHONS**

This MARLEY Cross-Flow has no secrets from the operator . . .

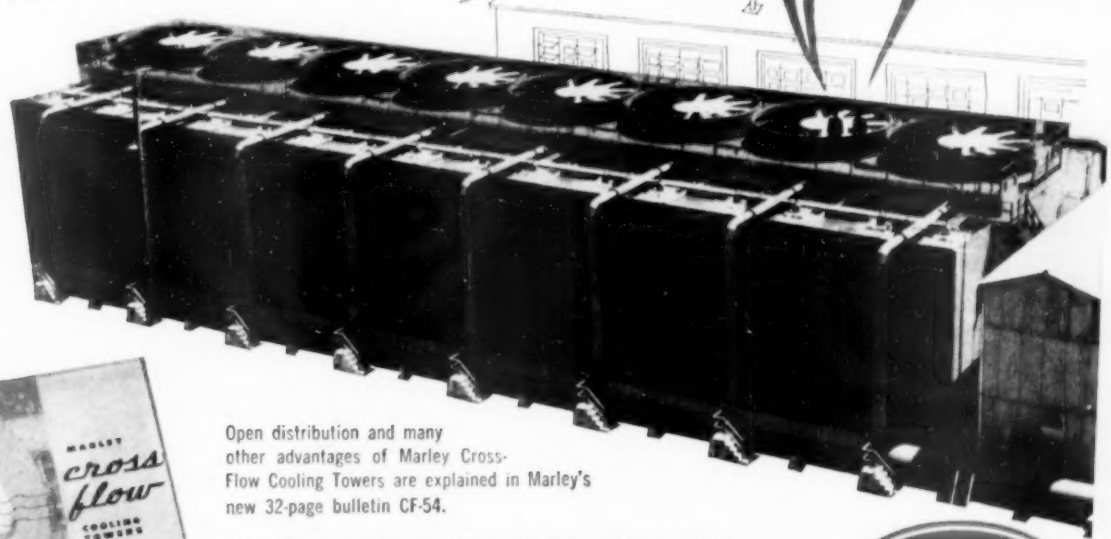
Open gravity distribution is one of the exclusive design features of Marley Cross-Flow cooling towers that makes them so "easy to live with" — and so economical to operate.

Is the water loading correct in every basin? Is the water flowing freely to every part of the tower fill? Are the basins clean? One glance and the operator of a Marley Cross-Flow has all the answers. And he takes that glance while making his inspection from a safe walkway. There is no need to subject himself to the hazards and discomfort of climbing into the tower to ascertain conditions.

If a change in water loading is desired, the valve is at hand and the variation in flow is visible. Since no pressure is required, increase or decrease in flow will not impair operating efficiency. No part of the fill will be starved; no part of the fill will be flooded.

Should a basin require cleaning, it is the work of minutes to shut down only the basin needing attention, clean it with complete safety and restore it to operation.

. . . a single glance tells you where you stand!



Open distribution and many other advantages of Marley Cross-Flow Cooling Towers are explained in Marley's new 32-page bulletin CF-54.

WRITE FOR FREE COPY TODAY!

The Marley Company

Founder-Member Cooling Tower Institute — Kansas City, Missouri

MARLEY

increase production and reduce operating costs

with

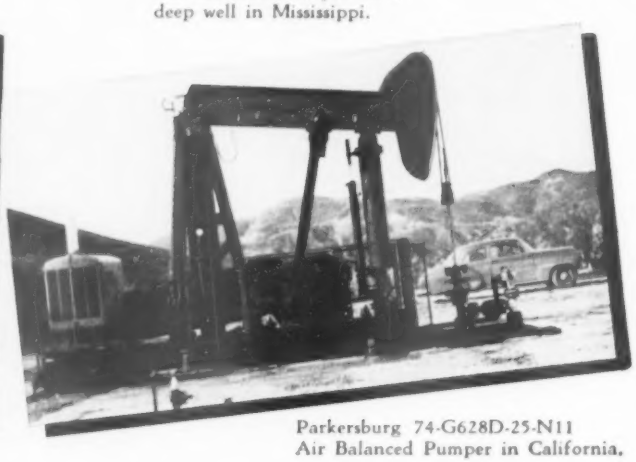
PARKERSBURG

Air Balanced

PUMPERS

Parkersburg 100-G456D-30-N11
Air Balanced Pumper on a
deep well in Mississippi.

Parkersburg 64-G160-20-N11
Air Balanced Pumper with Time Compensator.



Parkersburg 74-G628D-25-N11
Air Balanced Pumper in California.

It is mechanically impossible to build a conventional pumper capable of matching the performance of a Parkersburg Air-Balanced Pumper on wells below 6,000 ft. where rod loads are a problem. Time after time, field tests against comparable conventional pumpers have proved that Parkersburg Air-Balanced Pumpers:

1. Increase production by 10 percent or more under same operating conditions.
2. Reduce wear and tear on rods and eliminate breakage.
3. Reduce beam loads and engine maintenance and permit use of a smaller engine to achieve same results.
4. Show substantial savings on operating costs.
5. Cost no more installed.

When you are ready to talk pumpers let us tell you more about air-balanced units . . . and why Parkersburg's are by far the best buy on the market.

PESA

5405

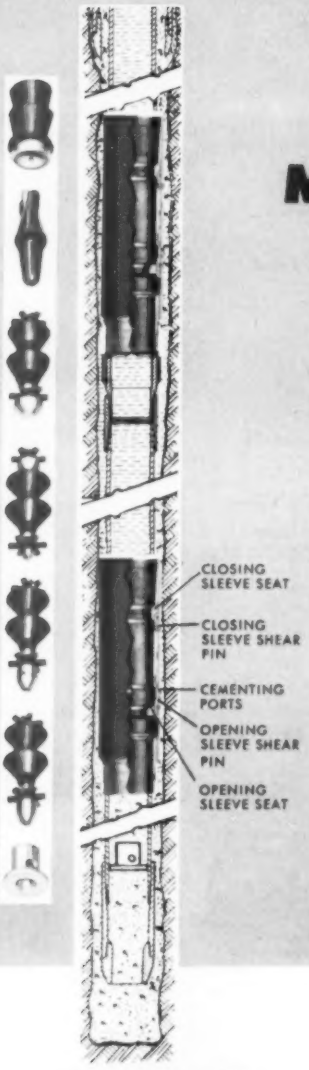
PARKERSBURG
OIL FIELD EQUIPMENT

The Parkersburg Rig & Reel Co., Parkersburg, West Virginia
Division of Parkersburg-Aetna Corporation

PUMPERS — Air Balanced • Chain Driven • Gear Driven

CEMENTS 3 STAGES

in 1 time-saving trip!



HALLIBURTON'S EXCLUSIVE ***DV*** MULTIPLE STAGE CEMENTER

This versatile tool is recognized by oil men as the universal multiple stage cementer. *For the DV alone permits 3 stage cementing without ever leaving the well* . . . offers three-fold savings in time, casing, and money.

You can rely on Halliburton's DV Multiple Stage Cementer for full depth cementing, reducing channeling, cementing off formation at any point, dual well completion, reducing pump pressures, and preventing loss of slurry to thieving formations.

This rugged Multiple Stage Cementer – employing the exclusive Differential Valve principle – is designed and built for safe application in any well regardless of depth, pressure, and temperature.

It features two telescoping steel sleeves. The lower or opening sleeve seals off tool ports during circulation and passage of cement for the lowest job. An upper or closing sleeve seals tool ports after completion of the next stage. A simple arrangement of opening and closing plugs and tool sleeves allows effective *three* stage cementing.

Million-job experience built the DV Multiple Stage Cementer . . . to help you save casing, time, and money. Take advantage of its many benefits on your next job. Phone your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

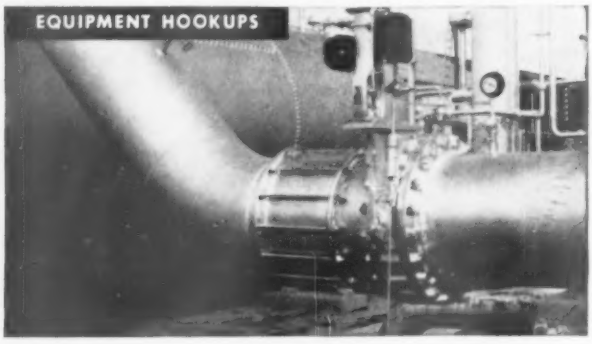
HALLIBURTON

CEMENTING SERVICES

"THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING!"

IN THE OILFIELDS . . .

the DRESSER way is *easier . . . surer!*



As an oilman, you're interested in joining pipe quickly . . . maintaining tight joints . . . making fast repairs with minimum losses and shutdowns. Using Dresser Couplings and repair products, you can do just that.

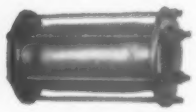
Dresser Couplings or Long Sleeves go together simply and quickly. Resilient Dresser Gaskets assure flexible joints which absorb settlement, other movement . . . on well and separator piping . . . salt-water lines . . . tank, pump, engine and compressor connections.

When a split, break or leaking joint occurs, Dresser Clamps and Sleeves turn an emergency into a simple repair job—completed in a matter of minutes *without shutdowns.*

You'll find there's a Dresser product for every condition and requirement affecting oilfield pipe lines, and that the DRESSER way is *always* easier, surer.

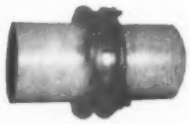
AVAILABLE AT ALL LEADING OILFIELD SUPPLY STORES

Style 38
Coupling


Style 40
Long Sleeve

Style 63
Expansion Joint

Style 39
Insulating Coupling

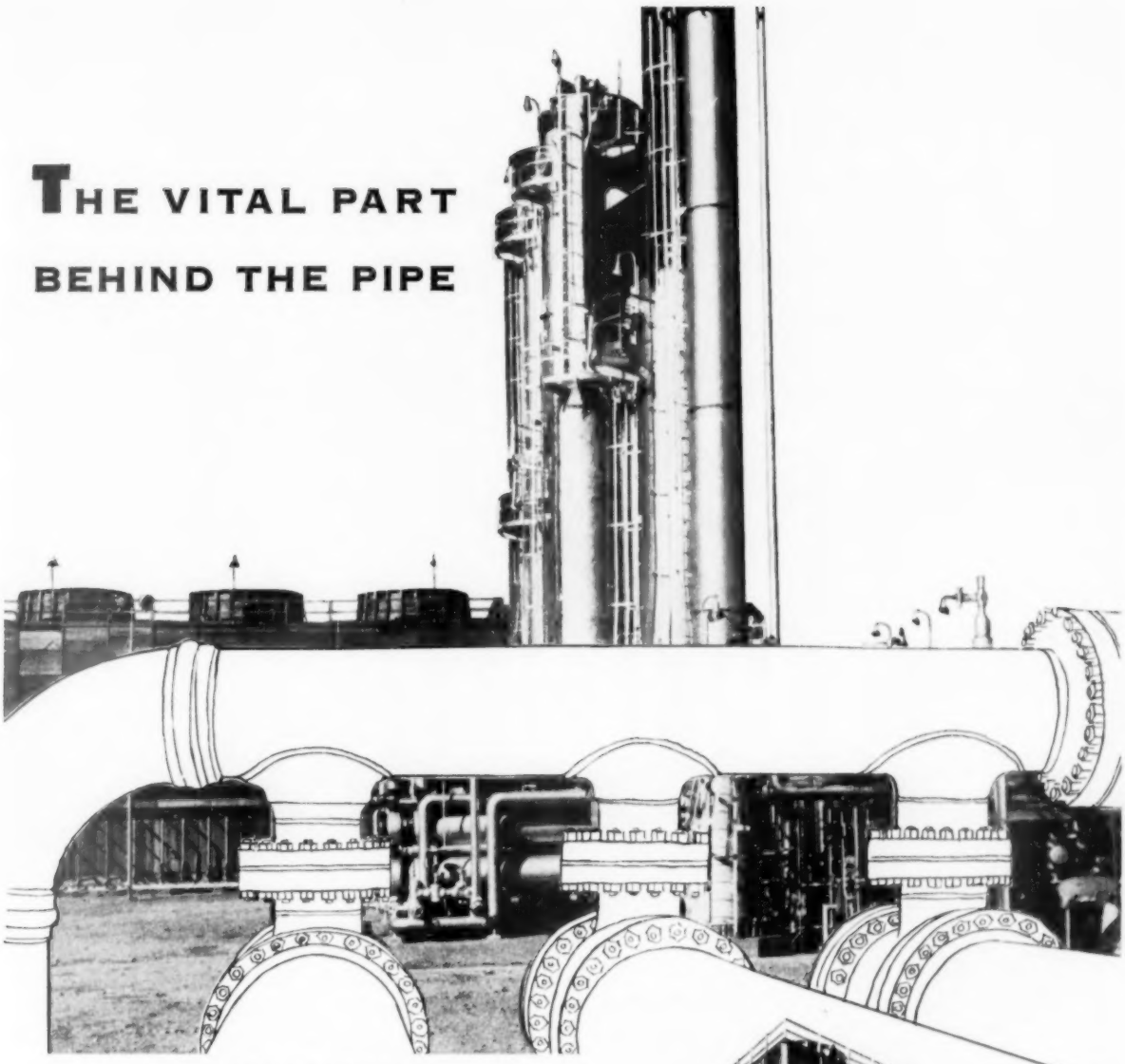

Style 55
Porous Weld Clamp

ALSO COLLAR LEAK CLAMPS, HIGH PRESSURE REPAIR SLEEVES

DRESSER® COUPLINGS

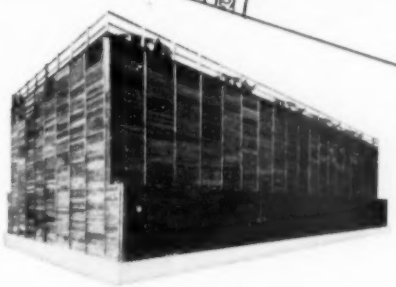
Dresser Manufacturing Division, 49 Fisher Ave., Bradford, Pa. (One of the Dresser Industries). Warehouses: 1121 Rothwell St., Houston, Texas; 101 S. Bayshore Highway, South San Francisco, California.

THE VITAL PART BEHIND THE PIPE



Look over the top of the pipe running across the picture. Right next to the fractionating columns, you'll see three fan throats of a multi-celled Pritchard cooling tower. Without the efficient functioning of that tower to cool process water, this modern refinery could not operate.

When you are choosing such a vital unit of your installation, remember that you can fully rely on Pritchard's proved design, engineering and construction abilities to provide the cooling tower that *best* meets your requirements.



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SPECIALIZED HEAT EXCHANGERS
GAS & AIR TREATING EQUIPMENT

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A DIVISION OF J. F. PRITCHARD & CO

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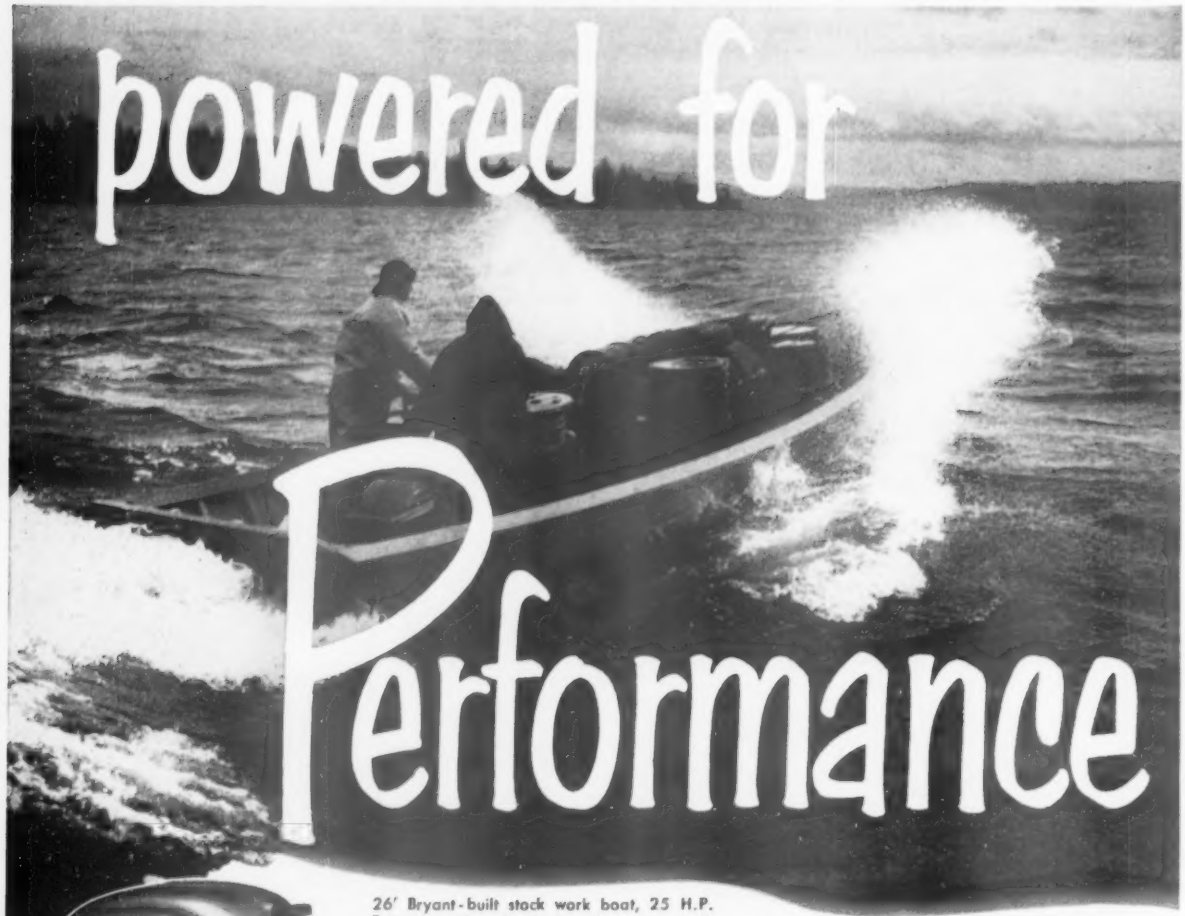
Representatives in Principal Cities from Coast to Coast

powered for Performance



26' Bryant-built stock work boat, 25 H.P. Evinrude outboard motor installed in stern well.

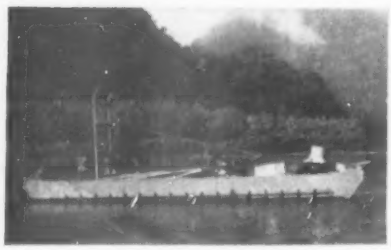
BIG TWIN
25 O.B.C. certified B.H.P. at 4,000 R.P.M. Gearshift, separate plug-in fuel tank.

PROVED PERFORMANCE! No "maybe" when it came to picking the power plant for this husky work boat. In identical hulls the Evinrude 25 H.P. Big Twin had conclusively proved its advantages over conventional engine installations of the same rated horsepower. Higher speed, light or loaded. Greater maneuverability. Important space saving. Easy beaching. *Far lower cost*—as much as $900 *less* than the conventional installations.

With *performance,* an Evinrude gives you stamina and low upkeep you couldn't beat in any type of motor. A complete line, 3 to 25 H.P., to meet the widest range of work boat needs. See your Evinrude dealer—look for his name under "Outboard Motors" in the yellow pages of your phone book. For complete literature write EVINRUDE MOTORS, 4380 North 27th Street, Milwaukee 16, Wisconsin.

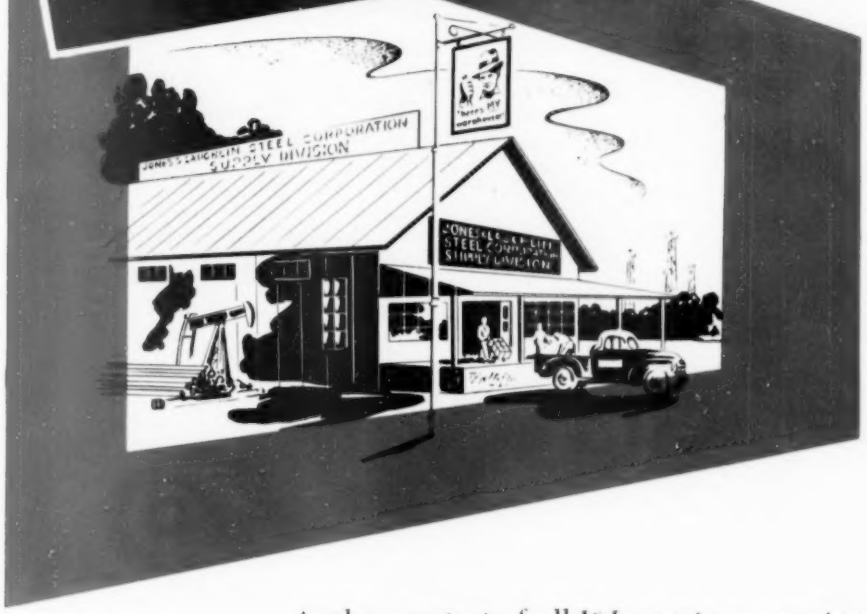
In Canada: Manufactured by Evinrude Motors, Peterborough, Ontario

Big Twin is also available in 20" extra depth model suitable for transom heights to 35". Photo shows Bristol Bay, Alaska, salmon gillnetters converted to power with this motor.



EVINRUDE
OUTBOARD MOTORS

SO YOU ARE A J&L CUSTOMER



As the greatest of all J&L assets — a customer — you will never be a stranger in the oil fields of the United States and Canada. You will be at home, supplywise, and among staunch friends wherever you go.

J&L men everywhere understand the long range principle of successful supply service — not how much they can get, but how much they can give.

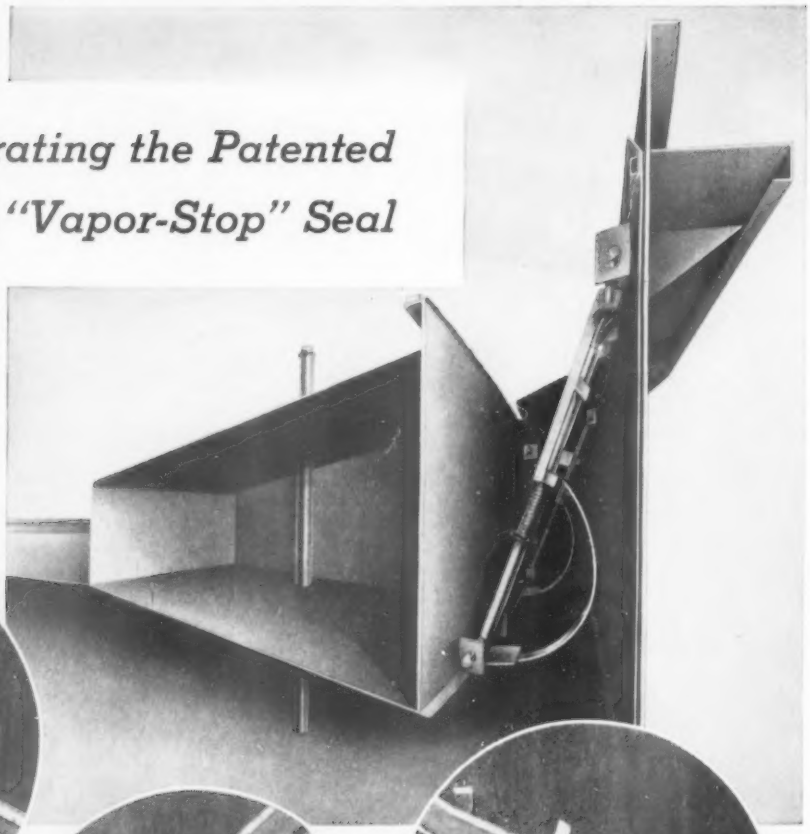
You may never have thought of yourself as important to J&L, but there is nothing casual in our appraisal of you! Without customers a business is bankrupt.

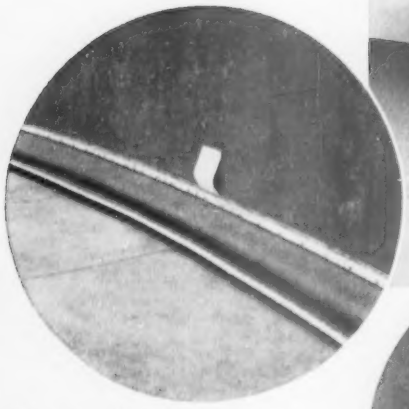
JONES & LAUGHLIN STEEL CORPORATION
SUPPLY DIVISION

Serving The United States and Canada
General Offices: Tulsa, Oklahoma
J&L Tubular Products and Wire Rope

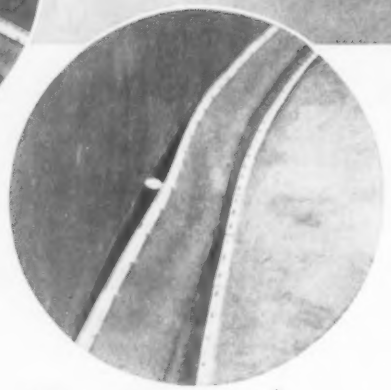
PESA
PARTNERS IN PETROLEUM PROGRESS

Demonstrating the Patented GRAVER *"Vapor-Stop" Seal*



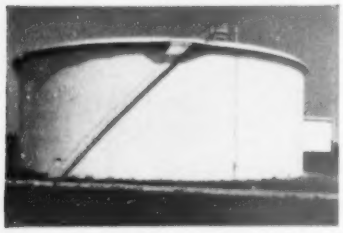


it's tight! As seen above, the Graver "Vapor-Stop" Seal provides a firm closure between the roof and tank shell—so tight that a piece of paper will not slip through.



it's sensitive! Despite its effective closure, the sealing mechanism is so sensitive it does not break the egg shown above, indicating the friction-free, long-lasting performance that the seal provides.

it's flexible! The seal is free to move over obstructions, yet continues to close the gap and prevent loss of vapors. It is successful on both converted tank shells and new construction.



The seal mechanism is an integral part of all Graver Floating Roof designs, including the Double-Deck Floating Roof tank and the Center-Weighted Pontoon and Pan-type Floating Roof tanks.

This patented seal is the key to the successful functioning of Graver Floating Roof tanks. Composed of two mechanisms—a weighted arcuate pusher and a spring-actuated hanger, it acts as a "Vapor-Stop," preventing loss of volatile vapors. The seal provides positive centering action for the roof. It also prevents the entrance of air and rain, and resists corrosion.

Simple and foolproof, it eliminates the need for multiple seals. The mechanisms are completely covered, and the fabric is asbestos coated with Neoprene, impervious to vapors. Graver's "Vapor-Stop" Seal is fire-resistant and Underwriters' Laboratories approved.

GRAVER

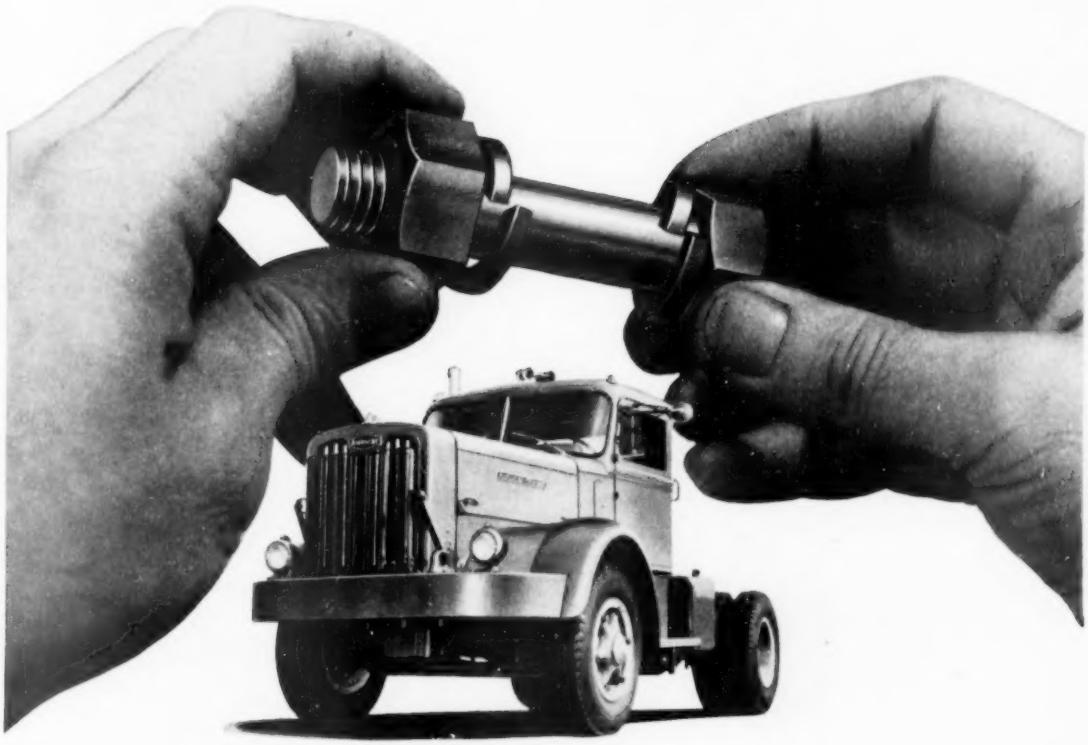
...a specific conservation design to fit every need.

GRAVER TANK & MFG. CO., INC.

East Chicago, Indiana

NEW YORK • CHICAGO • PHILADELPHIA • ATLANTA • DETROIT
CLEVELAND • PITTSBURGH • HOUSTON • CATASAUQUA, PA.
SAND SPRINGS, OKLA • CASPER, WYO. • ODESSA, TEXAS
LOS ANGELES • EDGE MOOR, DEL. • TULSA

35 YEARS AGO AUTOCAR SWITCHED OVER TO NUT & BOLT CONSTRUCTION



During a transcontinental test run way back in 1920, a spring bracket broke and had to be removed, brazed and remounted. Due to its location, it took a whole day to chisel through the rivets that held the bracket. Right then and there Autocar switched over to nuts and bolts. It was plain that rivets were not right for a quality product like Autocar. And besides, bolts permit the use of higher strength material than rivets. They're heat treated and fit the holes exactly. They're installed with heat-treated tension lock washers under both bolt head and nut for a permanent, tight fit. They make maintenance quick and easy because any part, even the frame rail, can be removed and replaced without special tools.

When you buy an Autocar, you get a sturdy, quality-built truck or tractor that stays in tip-top operating condition for years and years of dependable service. Fill in the coupon for more information.

AUTOCAR TRUCKS

Autocar Division of The White Motor Company
Ardmore, Pa.

Export: Drexel Building, Philadelphia 6, Pa., U.S.A.
Factory Branches and Distributors from Coast to Coast in the United States and Canada

AUTOCAR DIVISION OF THE WHITE MOTOR COMPANY
Ardmore, Pa.

How can Autocars improve my hauling operation?

Name_____

Firm Name_____

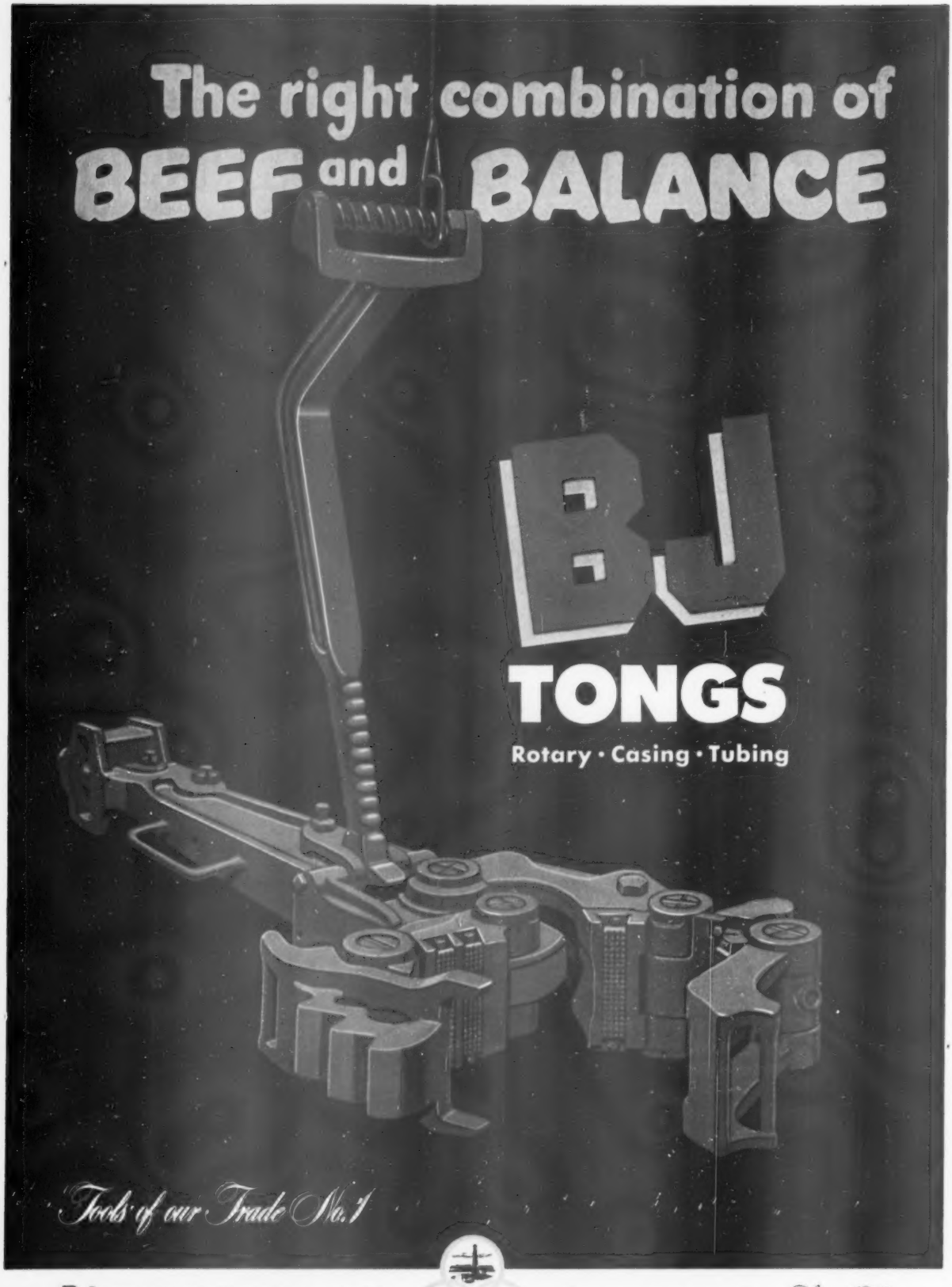
Address_____

Type of operation_____

No. of trucks in fleet_____

19C

The right combination of BEEF and BALANCE



BJ MEANS ENGINEERED OIL TOOLS

BJ PB

Byron Jackson Co. Since 1872

LOS ANGELES NEW YORK FORT WORTH HOUSTON

NEW LIFE FOR OLD LEASES WITH BUCYRUS-ERIE SPUDDERS

You can bring new life to old leases — chalk up extra profits — with Bucyrus-Erie spudders on your work-over operations. They offer you the modern mobile way to handle every job fast and effectively. Here's how:

THEY SAVE YOU TIME in moving with mobile truck, semi-trailer or skid mountings, designed for speed either over or off the road. Easy mobility helps crowd in many extra jobs each year.

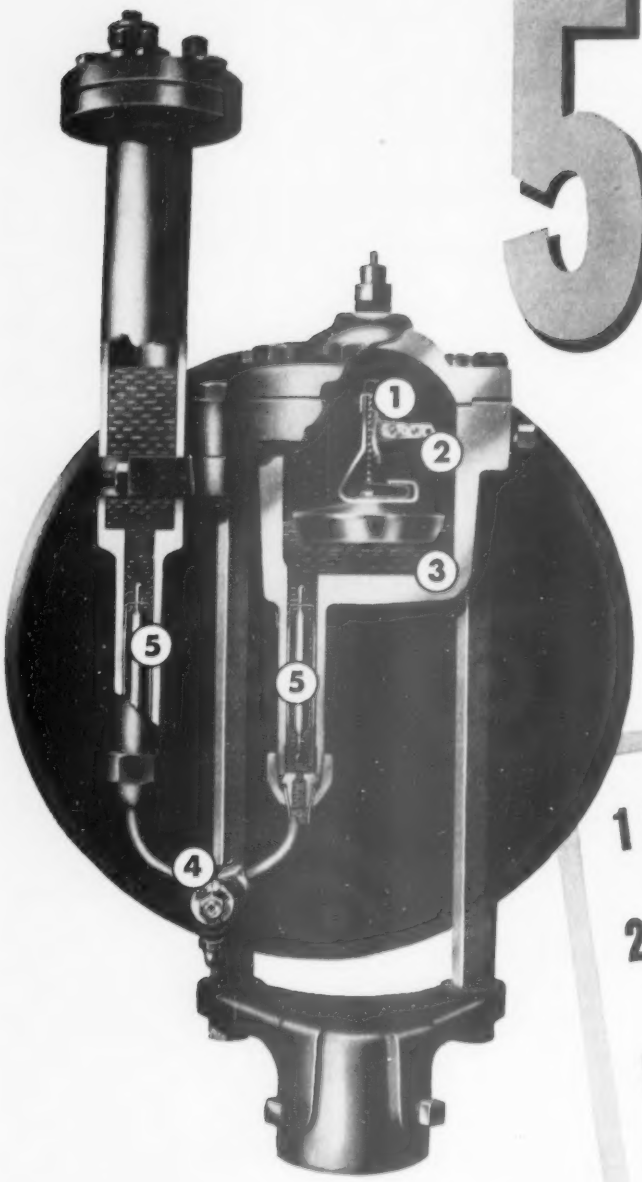
THEY SAVE YOU TIME in setting-up with power-raised telescoping derricks having braces that unfold into position for bolting.

THEY SAVE YOU TIME in handling tools, bailer, casing, etc., with large fast-spooling reels, big capacity derricks, ample engine power, responsive controls.

That's the kind of rig you need to restore or increase well production in a hurry. Get the full details on what Bucyrus-Erie spudders can do for you — they are profit producers on drilling, tailing-in, and other operations, too. See your nearby Bucyrus-Erie spudder distributor or write us today. 8553

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

5 basic advances that mean BETTER FLOW METERING!



1 New Segmental Drive Assembly — stainless steel ball-type chain insures perfect alignment and friction-free travel of float.

2 New Pressure-Seal Bearing — stainless steel with exclusive seal ring . . . gives unmatched freedom at any working pressure from friction, maintenance and leaks. No lubrication required.

3 New Compact Float Chamber — greater accessibility for easier, quicker cleaning.

4 New U-Bend and Damping Plug Assembly — self-aligning, all-welded construction . . . no gaskets required. Calibrated damping plug fully adjustable under pressure. Directed drain for mercury at lowest point.

5 New Check Floats — with positive-seating stainless steel ball plug. Submerged in mercury for complete protection against dirt and corrosion.

With major improvements in every basic detail, the complete new line of Foxboro Flow Meters now gives metering performance that's farther ahead of the field than ever before!

In addition to the outstanding advances illustrated, these new meters incorporate many other superior features, including: interchangeable parts; large floats with long travel for added power; and float in high pressure chamber to minimize ambient temperature effects.

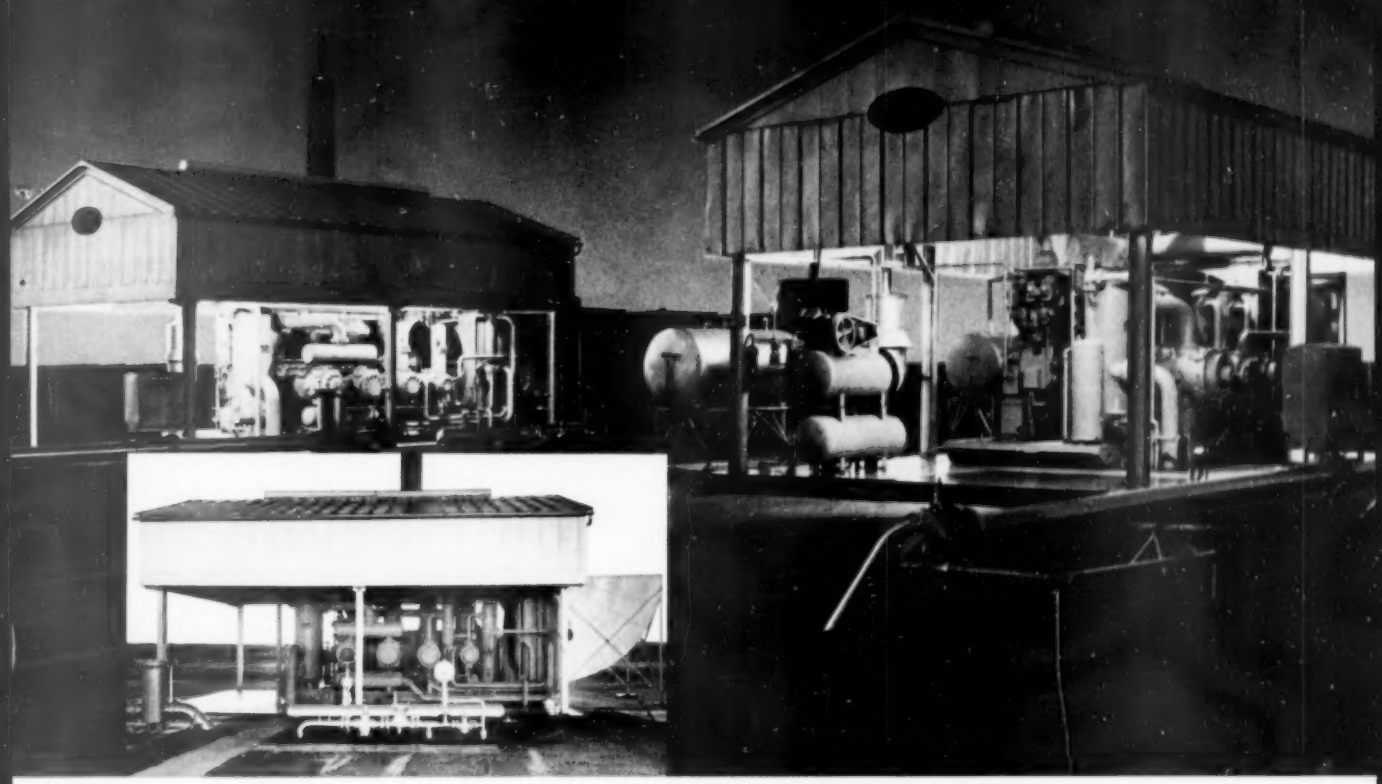
Write for new Bulletin 460. It describes the complete new line . . . indicators, recorders, controllers, transmitters . . . with round or rectangular cases . . . with and without integrators. The Foxboro Company, 604 Neponset Ave., Foxboro, Mass., U.S.A.

FOXBORO
Reg. U. S. Pat. Off.
First in FLOW METERS

BEAIRD-INGERSOLL-RAND

Packaged Compressor Plant

Lowest Cost Per Horsepower Installed



These two packaged compressor plants are complete units with Ingersoll-Rand gas engine driven compressors, Young radiators and all necessary auxiliary equipment and controls. Sizes from 110 h.p. to 660 h.p.

SOUTHERN MINERALS CORPORATION produces 46 oil wells in Falls City Field, Texas with a closed gas lift system. Approximately 3 million feet of compressed gas per day are required to lift the oil from formations 5000 feet deep. Of this, 2¼ million feet are supplied by a single three stage compressor station, equipped with two Beaird-Ingersoll-Rand packaged compressor plants, operated in parallel. The use of these plants in conjunction with a gas lift system makes it possible to concentrate the power source in one spot instead having many power units scattered throughout the field. The result is a saving to Southern Minerals in both installation costs and operating costs. The compressors were built as complete packaged plants in the Beaird factory. They were shipped, fully assembled, to location and installed in a short time without the usual expense and delays of field assembly. Once on stream, they continued to operate with only routine servicing. Special controls, built into the plants, speed up the compressor engines or slow them down to maintain required line pressures. And other automatic safety controls keep a constant watch on the units, day and night, to shut them down immediately in case any unusual operating conditions should develop.

Let us tell you how you can produce oil wells at lower cost with Beaird-Ingersoll-Rand packaged compressor plants.

Hold down costs—

2 PACKAGED COMPRESSORS PRODUCE 46 OIL WELLS

THE J. B. BEAIRD COMPANY, INC.

Shreveport, Louisiana

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS

BEAIRD Pressure Storage Tanks

Engineered For Safe Storage

Now ALL Beaird Tanks are X-rayed

You know the advantage of having all shell seams on pressure tanks X-rayed. And now that is standard practice on all our large LP-Gas and anhydrous ammonia tanks — not just spot X-raying — but complete X-raying of entire shell seams. For example, on each 30,000-gallon tank, over 200 separate films are exposed, developed and individually inspected. With these films, our inspectors can literally see through every inch of seam on the entire shell. They know the welding is sound.

That is why we have gone to the expense of installing the most modern radiographic equipment — to assure you that the Beaird tanks you receive are engineered and manufactured for safe storage.

Let us quote you on your pressure storage requirements.

THE J. B. BEAIRD COMPANY, INC.
SHREVEPORT, LOUISIANA

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

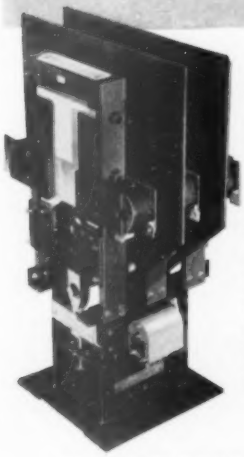
ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS

which contactor meets your needs

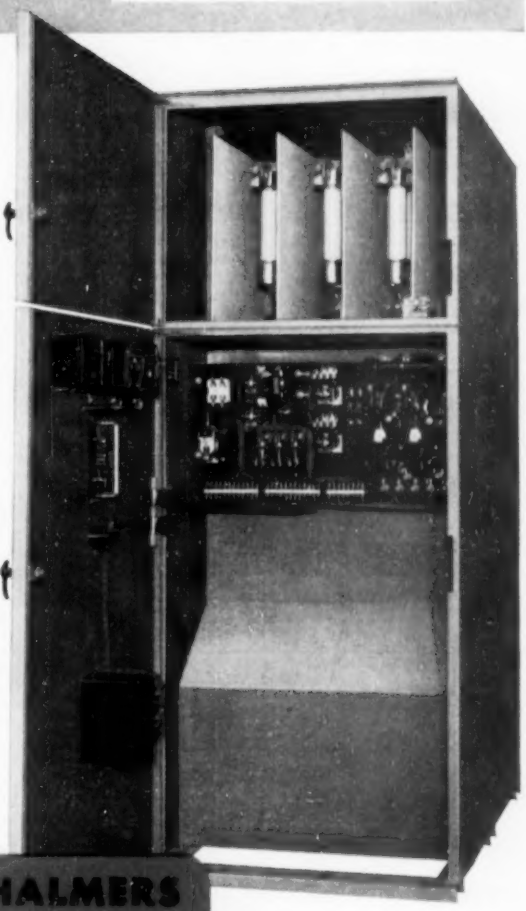
AIR or OIL?

Either may be built into your Allis-Chalmers Type H starter along with meters, overload relays, current limiting fuses, auxiliary switches . . . the coordinated components dictated by your application for complete protection of man, motor and machine.



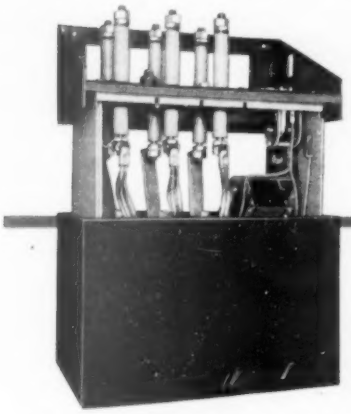
AIR-BREAK CONTACTOR

When the going's rough . . . that's the place for the Type 256 air-break contactor. Frequent starting, inching, reversing or dynamic braking are taken in stride by this rugged performer. And, of course, fire hazard is greatly reduced. No turning shafts, shaft bearings and flexible leads to cause maintenance headaches. Double-break contacts, vertical action and dual blowouts provide long, trouble-free operation.



OIL-IMMERSED CONTACTOR

Got atmospheric troubles? The Type MO oil-immersed contactor will perform heavy duty starting service in dust-laden, corrosive and very moist atmospheres. Contactor is of the time-proved clapper type. Self-cleaning, rolling-wiping action extends contact life. Make and break arcing occurs only on tips. Self-aligning E type magnet provides perfect armature seating . . . long, quiet operation. Permanent windlass tank-lifter simplifies maintenance. A-4103



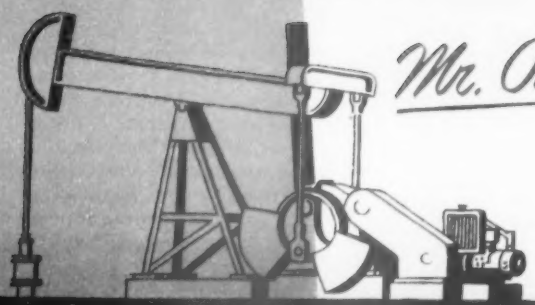
ALLIS-CHALMERS

Type H Starters

FOR 2300 TO 5000 VOLT MOTORS

Call Your Nearby A-C Representative or Write
Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 14B6410B.

ALLIS-CHALMERS



Mr. Oil Producer:

For the lowest-cost pumping with complete dependability . . .

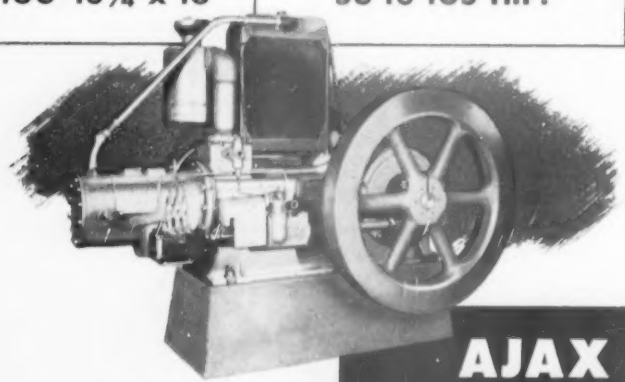
MODEL	A.P.I. HORSE POWER RATING
5 x 6½ WL	5 to 12½ H.P.
6½ x 8 CMA	12 to 19 H.P.
7¼ x 8 CMA	13½ to 22½ H.P.
7½ x 10 CMA	16 to 26 H.P.
8½ x 10 CMA	21½ to 36½ H.P.
DP-70 11 x 14	34 to 70½ H.P.
DP-100 13¼ x 16	56 to 105 H.P.

Pick the right horsepower and *Specify*

Ajax

***The Complete line of* OILFIELD PUMPING ENGINES**

AJAX makes it easy for you to pick the type and size of pumping engine best fitted to your needs—we build them in the entire range demanded by today's oil producers. And AJAX and your Supply Man make it easy for you to compare the facts—we have them all! *Let us serve you.*



AJAX

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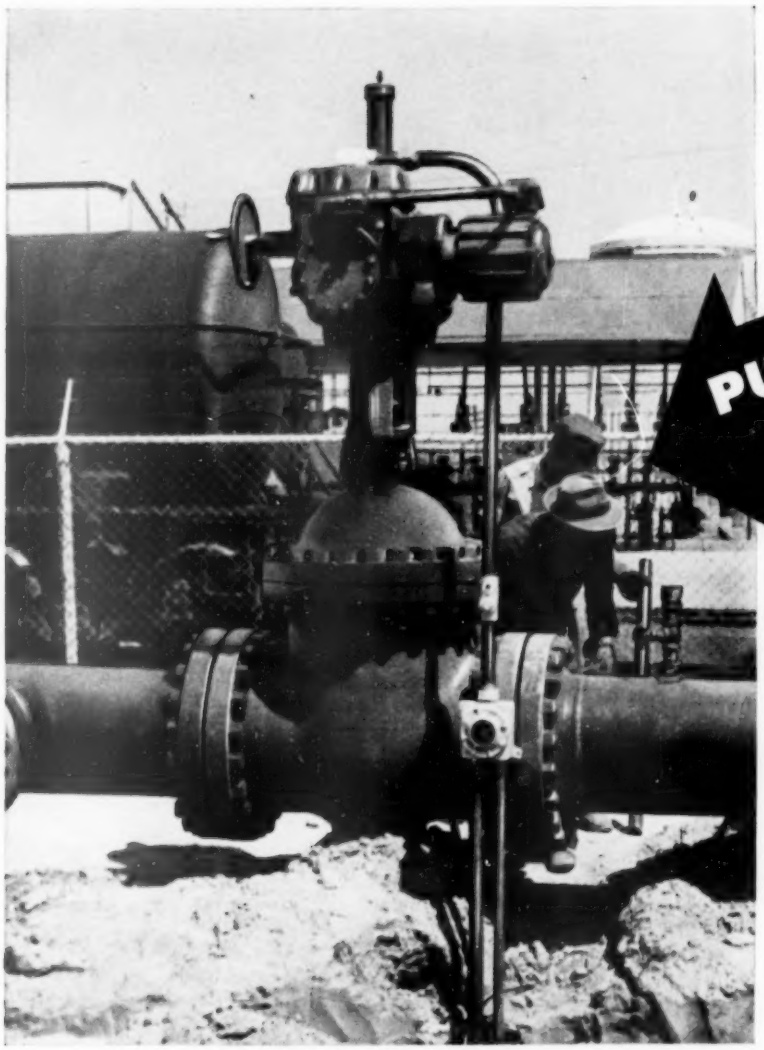
AJAX IRON WORKS

Builders of GAS AND OIL ENGINES, PRESSURE PUMPS, STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA.
R. B. MOORE SUPPLY CO., BOLIVAR, N.Y. • BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA



PUT IT IN... FORGET IT!

it's a Darling pipe line gate valve

Typically, this motor-operated, 18" Darling cast steel gate valve of the fully revolving, double disc parallel seat type, is now cutting costs and maintenance on a major cross-country products line.

WHEN it's a Darling pipe line gate valve you *can* forget it—for longer than you ever thought possible! Despite extreme temperature changes, despite severe line stresses, this valve closes tight every time. It requires less maintenance. You get *surer* valve performance, year in, year out.

It's all a matter of principle—a unique but simple one—*Darling's fully revolving, double disc, parallel seat* principle! It automatically compensates for valve body distortion, equalizes disc and seat wear, cuts down-time and maintenance to the bone!

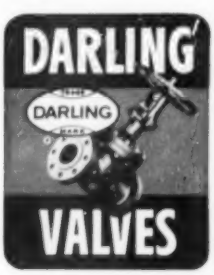
Get *all* the facts—money-saving, time-saving facts that make these Darling gate valves preferred equipment today in all kinds of oil and gas line service everywhere. Simply outline your particular service needs or ask for a complete descriptive bulletin.

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ont.

FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN



roadways made easy

PHOTO COURTESY HETHERINGTON AND BERNER INC., INDIANAPOLIS, INDIANA

Chrysler *Power helps keep America rolling . . . at less cost*

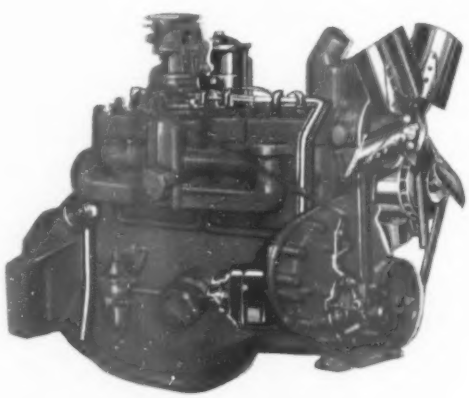
This mobile mixer-paver replaces costly man-hours with economical horsepower. In one continuous operation the unit takes in sand, gravel, stone or other road surfacing materials, mixes them in with a binder ingredient—all in predetermined proportions—and spreads the mixture onto the roadbed, to whatever depth best meets grade and crown requirements. Materials to be mixed may be fed to the unit from trucks, as in this case, or picked up from windrows with a loader attachment. The entire operation requires the services of three, possibly four, men.

The Hetherington and Berner Moto-Paver turns out up to 120 tons of mix per hour for resurfacing jobs. Paving width is adjustable from 8½ to 12 feet, depths to 7 inches. Paving speeds start at two feet per minute. Road speeds up to twenty-five miles per hour enable the equipment to carry itself from one job to another.

Two Chrysler Industrial Engines power this equipment. Travel components are driven by our Model 8 Engine whose 250 cubic inch displacement, together with Chrysler gýrol Fluid Coupling, provides power with flexibility of operation. A Model 14, powerful 331 cubic inch displacement engine, drives mixer, conveyor, spreader and pumps.

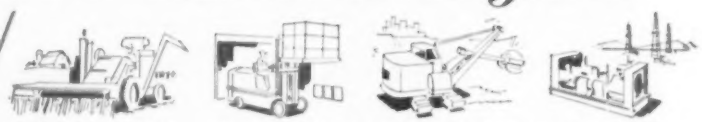
If your equipment requires power within our 230 to 413 cubic inch displacement range, engines that will operate equally well on gasoline, natural or L-P gas fuels, engines ideally suited to power take-off, see a Chrysler Industrial Engine Dealer. He can *power-fit your equipment for best performance in the field.*

Remember, too, that Chrysler Power is not expensive. Production-line methods adapted to specialized industrial engine building provide a custom-built engine at mass-production prices. If you prefer, write: ***Department 143, Industrial Engine Division, Trenton, Michigan.***



CHRYSLER *Industrial Engines*

HORSEPOWER WITH A PEDIGREE



AGRICULTURE • INDUSTRY • CONSTRUCTION • OIL FIELDS

Oil helps him be a better fighter...

IS THERE anything as fickle as fire? One minute it's working for man. The next — it's a wild crazy thing, hot after him, his wife, his kids, and all he owns.

Fire strikes in the U. S. A. almost a million times a year. That's why the fireman's got to be ready day and night. Ready to fight it to the finish . . . maybe his.

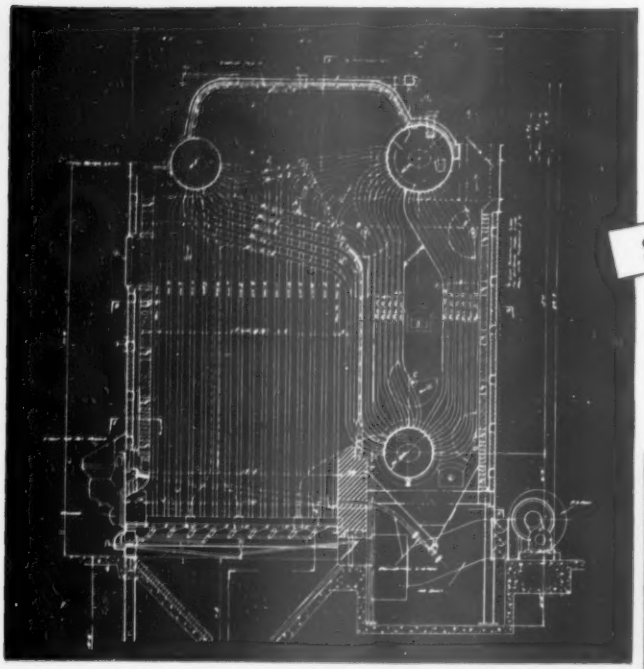
He needs — and he gets — a lot of help in his job: fast, fully-equipped trucks... alarm systems... chemicals . . . water . . . and oil. Oil products to power his trucks and keep them dependable through lubrication . . . to operate the hydraulic systems that hoist his ladders.

The Texas Company — with its superior petroleum products — has long been a vital factor in this constant battle.

The Texas Company

TEXACO

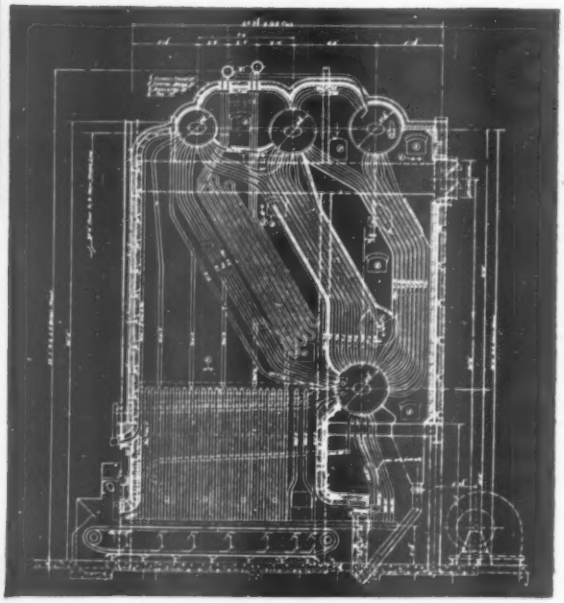
Quick Steaming at all Ratings!



Carry high overloads with high efficiency

SPECIFY Vogt

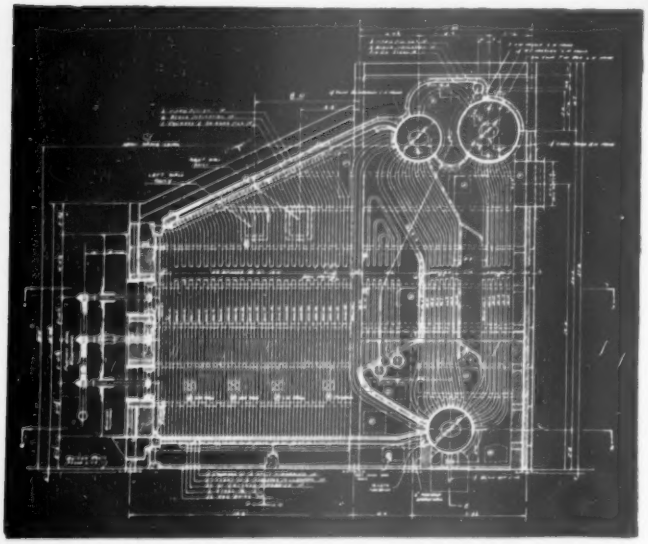
STEAM GENERATING UNITS



CLASS VL Two 27,500 pounds per hour units, installed at Brown-Forman Distillers Corporation, Louisville, Ky. Features large furnace volume in limited space, with high ratio of radiant heating surface.

CLASS LE Mt. Carmel Public Utility, Mt. Carmel, Illinois, is served by this 60,000 pounds per hour unit. Generous steam liberating surfaces and steam space permit wide fluctuations in load.

CLASS VR 70,000 pounds per hour steam generator at Humble Oil and Refining Company, Johnsue, Texas. An efficient, high-duty unit with water cooled furnace, using refinery gas fuel.



Vogt builds a complete line of bent tube steam generators, designed to burn solid, liquid, or gaseous fuels to meet specific operating conditions. Superheaters, air preheaters, economizers, water walls, and soot blowers can be readily incorporated. Bulletins with general information and showing typical installations are available upon request.

HENRY VOGT MACHINE CO.

LOUISVILLE 10, KENTUCKY

BRANCH OFFICES:
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Compare Kralastic *with any other pipe material!*

Kralastic® gives all these advantages:

- extreme lightness and ease of handling (spec. grav. 1.06).
- complete elimination of electrolysis and most corrosion problems.
- solvent welding—fast, cheap, requiring less skilled labor.
- unusually low internal friction.
- relatively inexpensive fittings.
- ease and speed of repair.
- ability to be threaded—used with threaded fittings.
- outstanding collapse resistance.
- high heat resistance (ASTM Test D648-45T, 187°F.).
- great resistance to bursting.
- unusually good chemical resistance.
- remarkable dimensional stability—extremely little cold flow.
- excellent resistance to ultra violet rays.
- no pick-up of calcium carbonate from water.
- no need for heavy bedding or costly joint tests.
- snake-ability—easy and cheap installation.

Kralastic is a styrene copolymer alloyed with a rubber copolymer—*the first rubber-resin to be used successfully for plastic pipe.* Compare Kralastic with any other pipe material for all around ease of installation, serviceability, and economy. You'll soon see why it's rapidly replacing other materials in the transport of oil, natural gas, brine, and water—why it's *the* material for *hundreds* of pipe uses.

Find out more about this amazingly tough and durable plastic pipe material and the advantages it offers you. Write on your letterhead to the address below, today.

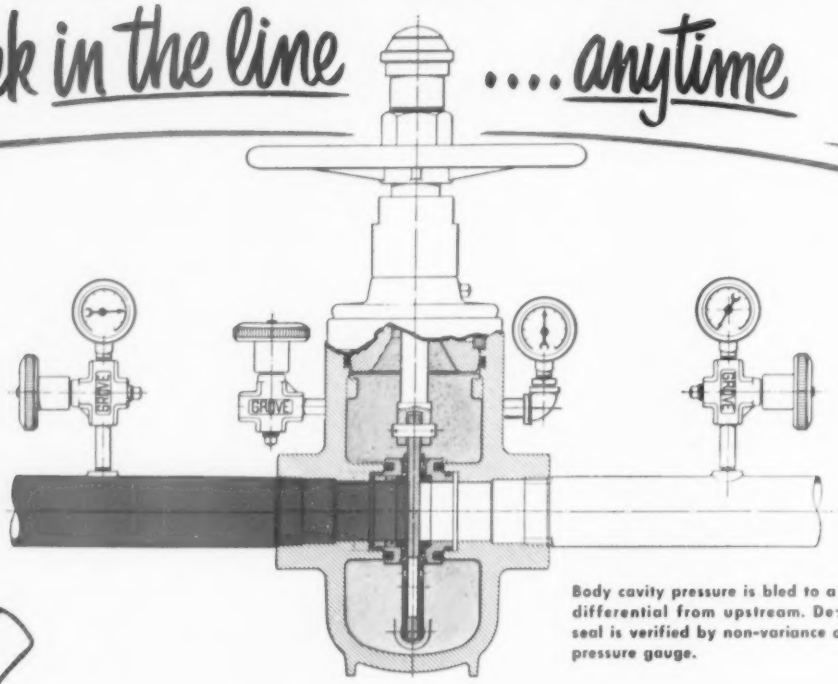
50TH ANNIVERSARY 1904 1954 NAUGATUCK CHEMICAL

Naugatuck Chemical

513 ELM STREET, NAUGATUCK, CONNECTICUT • *Division of United States Rubber Company*

BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • Memphis • New York • Philadelphia • IN CANADA: Naugatuck Chemicals, Elmira, Ontario

The only GATE VALVE you can Check in the line ....anytime

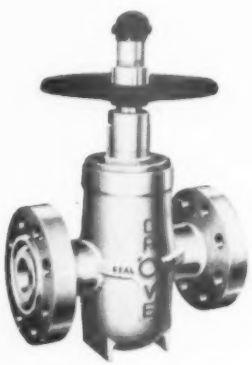


Body cavity pressure is bled to a specific differential from upstream. Dead-tight seal is verified by non-variance of cavity pressure gauge.

1...FOR POSITIVE DEAD-TIGHT SEAL
2...FOR FREE-MOVING GATE ACTION

FULLY AUTOMATIC INTERNAL RELIEF OF EXCESS BODY PRESSURE TO UPSTREAM

Grove Seal-"O"-Ring Gate Valves provide a positive fool-proof method of checking dead-tight seal and free-moving gate action *in the line,* at any time. Just three pressure gauges...on the upstream, on body cavity, and on downstream line tell the full story. Over a full turn of the handwheel without breaking the seal checks the freedom of the gate without opening the valve. Piston action of Seal-"O"-Ring valve seat assemblies, actuated by pressure differential provides automatic internal relief of excess body pressure to upstream line. Grove Seal-"O"-Ring Gate Valves hold tight as a line blind, yet allow free movement of gate at all times. These facts can be demonstrated, tested and proved to your complete satisfaction. To arrange for test, write today.



See this test for yourself!

We will gladly arrange to make this conclusive test for you and any group in your organization or area at a time and place, most convenient.

GROVE SEAL-"O"-RING Gate Valves

GROVE REGULATOR COMPANY • 65th & Hollis Sts., Oakland 8, California

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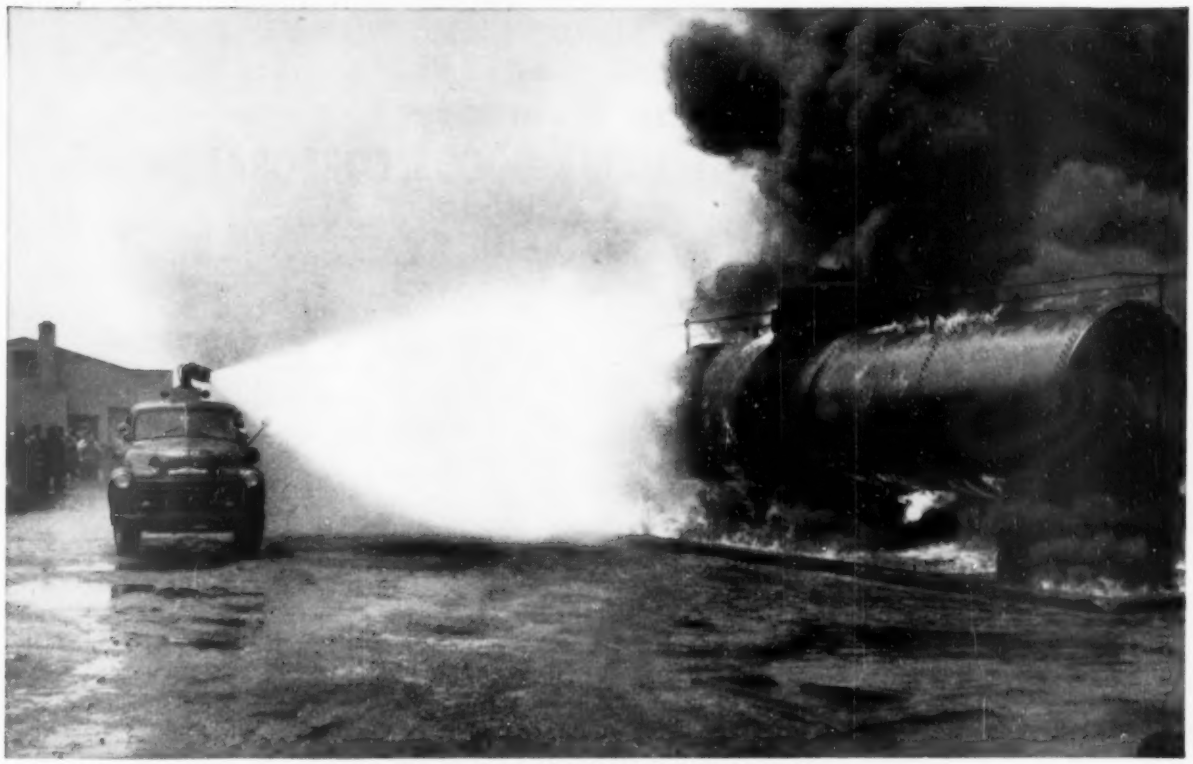

Long range, solid cone of Rockwood WaterFOG snuffs out fire.

"Little Mo" knocks 'em down

He *likes* to go to blazes.

"Little Mo" — a small fire truck that's packed to the hilt with Rockwood fire-fighting equipment — streaks to fires, knocks 'em down and quenches them in seconds. Can be operated by one man, if necessary!

In the test above, fuel in a pit under the tank cars was set on fire — and more fuel poured on top of the cars from pipes. This, too, was ignited and the blaze given a minute's start. In rushed "Little Mo" — and out went the fire in 45 seconds, choked off by Rockwood WaterFOG from Rockwood's Remote Manual Control Turret. What's more, 10 inches of water still remained in "Little Mo's" 200-gallon booster tank, after the fire was out.

It's Loaded! "Little Mo's" equipment includes: 4 stage centrifugal pump with electric primer, 200-gallon booster tank, Rockwood Dual Suction Proportioning System for FOAM and "Wet", Rockwood Remote Manual Control Turret controlled from within cab, Rockwood Ground Sweep Nozzles, Rockwood Remote Control Ball Valves, 2 Hannay reels with 200 feet of high pressure hose with new Rockwood High Pressure Handline Nozzle on each reel.

Thanks to Rockwood portable fire-fighting equipment, even a small truck like "Little Mo" can battle fires with powerful efficiency. The Turret Nozzle, alone, discharges solid water stream, WaterFOG, FogFOAM, solid FOAM, "Wet" solid water, and "Wet" WaterFOG! Rockwood engineers water to cut fire losses.

Leading manufacturers of fire trucks will install Rockwood Fire Fighting Products at your request.

ROCKWOOD SPRINKLER COMPANY

ROCKWOOD *Engineers Water . . . to Cut Fire Losses*

SEND FOR THIS INFORMATIVE BOOKLET

ROCKWOOD SPRINKLER COMPANY
Portable Fire Protection Division
104 Harlow Street
Worcester 5, Mass.

Please send me your illustrated booklet on Rockwood fire-fighting products.

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Company .....
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Zone ..... State .....

"Don't build up an inventory ... make use of METAL GOODS CORPORATION'S large warehouse stocks!"

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Take advantage of our metal supply service—it's practically as fast as getting the stock right from your own racks—and it saves you money in the bargain! You see, whether you use Aluminum, Brass, Bronze, Copper, Monel*, Inconel*, Nickel*, Steel or Stainless Steel, Metal Goods Corporation can supply it, in practically any commercial form, quickly and completely! Hundreds of large and small users of these metals are letting us solve their metal supply problems and benefiting by it—in money and floor space saved—in payroll and overhead avoided. Give it a try—call your nearest Metal Goods Corporation representative today. You'll find him anxious to serve you.

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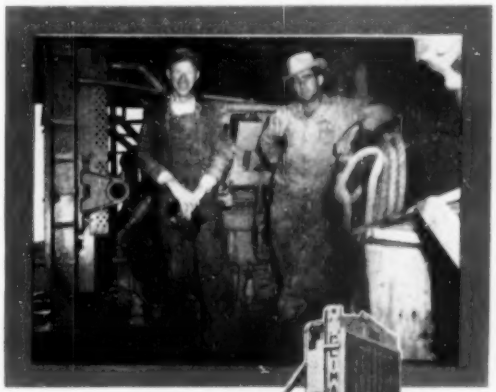
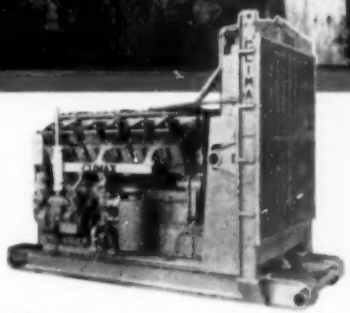
ANOTHER POWER PROBLEM SOLVED

With Climax Blue Streak Engines

E. S. Hooker and A. F. Hatcher of Grey Wolf Drilling Company



Steady, reliable power really pays off in oil field operations. That's why Grey Wolf Drilling Company chose Climax Blue Streak Engines for their rig illustrated above. They know they can depend on Blue Streak's instant throttle response for fast hoisting. They know too, that year to year durability and economy under continuous heavy loads is a mighty important engine feature and the rugged design of Climax Engines provides top performance under every operating condition. Add to these outstanding engine qualities the fact that Climax Blue Streak Engines are designed to operate with equal efficiency on either Butane or Natural Gas and it's easy to understand why operators everywhere call Climax the number one name in engines. Climax Distributors are available for quick dependable service. Ask the one nearest you today for complete details about the Climax Blue Streak Engine best suited for your particular requirements.



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BLUE STREAK ENGINES

CLIMAX ENGINE AND PUMP MFG. CO.

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WHAT'S YOUR ALLOY STEEL PROBLEM?

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MACHINABILITY?
HEAT TREATMENT?
TOOL LIFE?
SURFACE FINISH?
LOW PRODUCTION?
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Check your problem . . . or problems. Then call in Republic's 3-Dimension Metallurgical Service.

The man you meet will be the Republic Field Metallurgist. He comes to your plant, studies your product, examines your production methods. His report goes back to the Republic Mill and Laboratory Metallurgists.

These three specialists then work together to diagnose the trouble. From their wide knowledge of alloy steels, how they respond to forging, to heat treatment, to any work or process, they make recommendations. Not general ones, but those suitable for your plant and your particular problems, based on efficiency. And they stay within, or below, your cost limits. The results? Higher quality, greater output, economy.

Scores of Republic customers already have attained these benefits by taking advantage of this service. Ask your Republic salesman to call in his 3-Dimension Metallurgical Service. It's yours for the asking.

3-DIMENSION Metallurgical Service

. . . combines the extensive experience and coordinated abilities of Republic's *Field*, *Mill* and *Laboratory* Metallurgists with the knowledge and skills of your own engineers. It has helped guide users of Alloy Steels in countless industries to the correct steel and its most efficient usage. IT CAN DO THE SAME FOR YOU.

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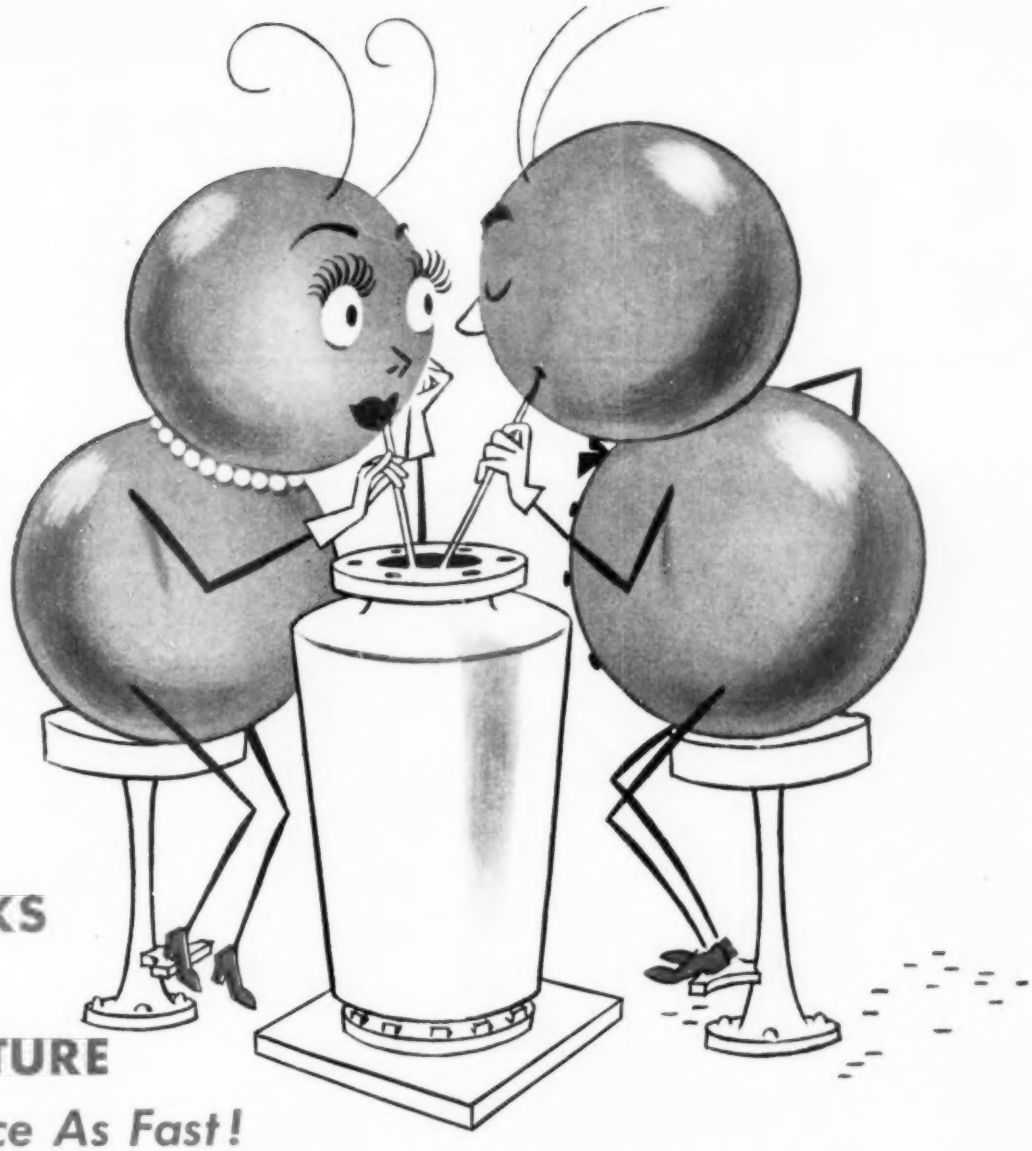


DRINKS UP MOISTURE

Twice As Fast!

Use S/V Sovabead in Your Dehydrator!

Ever watch two thirsty kids go to work on one soda? That's how fast S/V Sovabead drinks up moisture. It can almost *double* your dehydrator efficiency. And it stays just as thirsty at temperatures up to 120°F!

What's more, S/V Sovabead eliminates caking...reduces channeling, dusting and pressure drops. It also provides longer dessicant bed life...can be reactivated fast and economically.

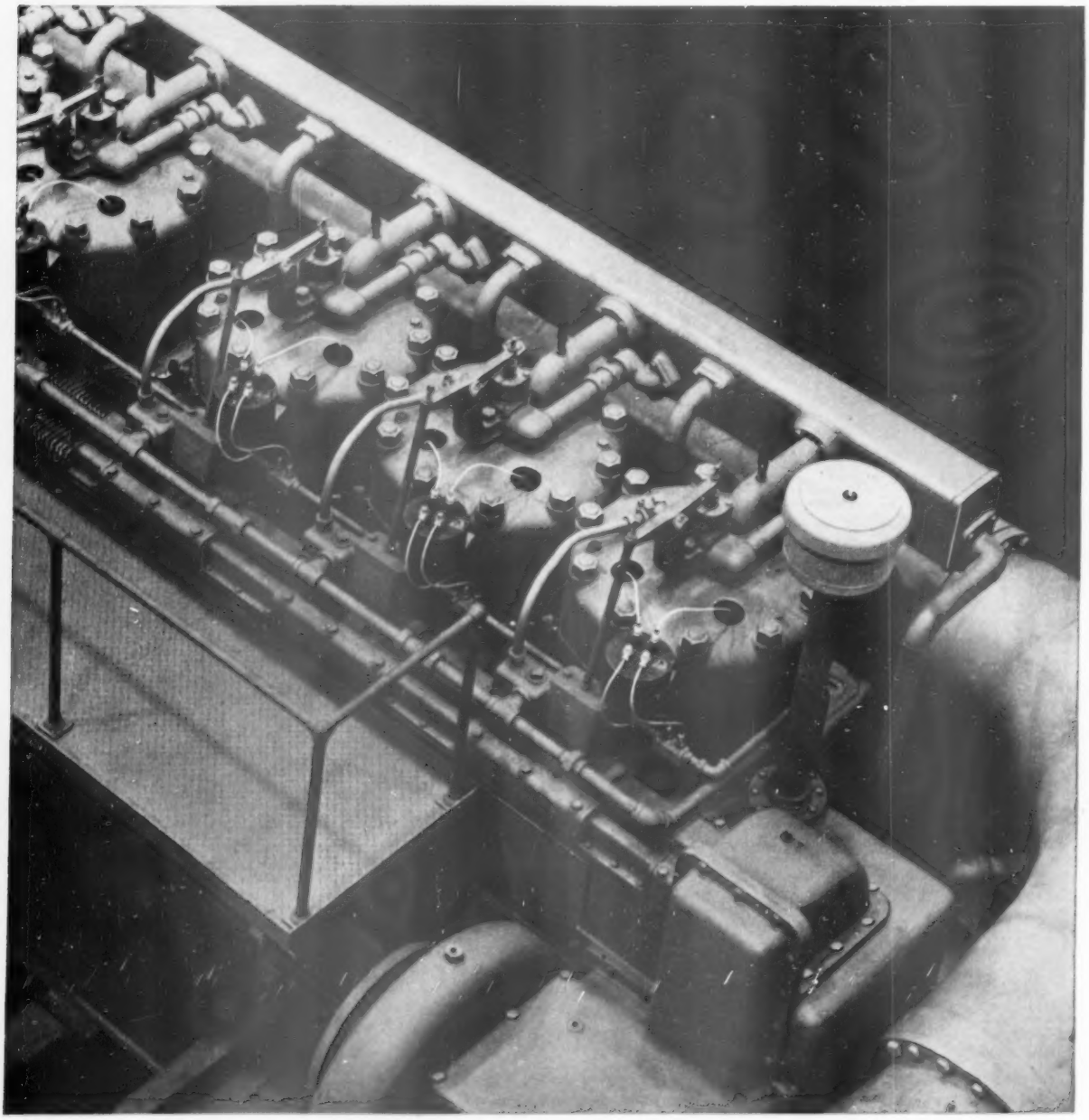
Put *S/V Sovabead* to work in your dehydrator. Your Socony-Vacuum representative can tell you all about it.

SOCONY-VACUUM
process products

Process Products

SOCONY-VACUUM OIL CO., INC., 26 Broadway, New York 4, N. Y., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.

SIMPLICITY



...a distinguishing feature of Clark Turbocharged Compressors

Don't take our word for it. Look at the picture. Look at the parts that *aren't* there! Simplicity — in a word — best describes the Clark Turbocharged 2-Cycle design.

Exhaust valves? Scavenging cylinders? You won't find them. There aren't any.

Everything is out in the open. With the Clark inline design, *nothing* is buried under a maze of "hot" parts.

But, this Clark simplicity is not just skin-deep. It applies to the inside as well. There are no lost motions. To develop maximum power, every down stroke of the pistons is a power stroke. Actually, the number of moving parts is practically cut in *half*.

Best of all, to match the inherent simplicity of *all* Clark 2-cycle compressors, turbo-charging has been applied in such a simple, foolproof manner that the operator can forget it's there.

Burning less fuel, requiring less cooling water and developing more power per cubic inch of piston displacement than any gas-engine-driven compressor in the world, Clark Turbocharged Compressors *defy* comparison.

For complete information on Models TRA and TLA, in sizes ranging from 825-3300 bhp, see your Clark representative. Request Bulletin 130.

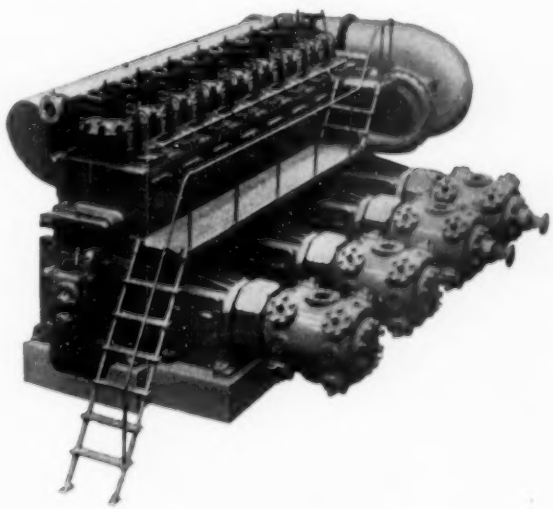
CLARK BROS. CO. • OLEAN, N. Y.

DIVISION OF DRESSER OPERATIONS, INC.

SALES OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

CLARK

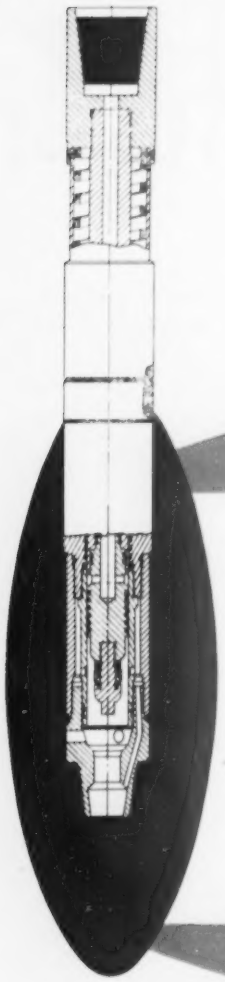
compressors



Clark sets the pace in compressor progress

ONE testing string with EVERYTHING...

TO PROVIDE MOST COMPLETE, MODERN, ACCURATE DATA AVAILABLE...



HALLIBURTON'S
HYDRO-SPRING TEST

The majority of operators, approving the leader, pick Halliburton's Testing Service. For here is the one complete string with *all* the newest fact-finding tools and instruments to provide more information more accurately.

MAKING TESTING HISTORY ARE THESE HALLIBURTON FEATURES:

NEW HYDRO-SPRING TESTER

Opens easily by weight of drill pipe with positive surface indication. Eliminates rotating, dropping bar, turning J slots. Can be run in faster, reaches bottom easier, even in tight holes. Permits reversing off bottom while taking closed in pressure. Performs test with far greater success than any ever used.

NEW EQUALIZING BY-PASS

Allows easy, rapid descent of string, reduces possibility of damaging formation, prevents fluid loss to formation, prevents flow of fluid from productive formation below bottom packer.

NEW EXPANDING SHOE PACKER

Decreases jarring and pulling to release packer, minimizes drag going in hole, reduces number of misruns in over-sized holes, leaves less rubber to be drilled out.

BOURDON TUBE PRESSURE RECORDING DEVICE

Provides greater accuracy in recording pressures. Absence of packing glands makes it super-sensitive to the slightest variations of pressure changes. Included with Standard Pressure Recording Device at no extra cost.

Now add Halliburton's million-job experience, quarter-century research, the close attention of responsible personnel, the minutes-away availability of Halliburton's 211 camps – and you'll agree it deserves its leadership. Be sure you get the *one* testing string with *everything* for the most modern, complete, accurate data. Phone your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

Hydro-Spring Tester – Patent Applied For

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HALLIBURTON
SERVICE

HALLIBURTON'S BEST FOR YOUR DRILL STEM TEST

TV in automobiles?

There are mighty few cars equipped with TV sets. In fact, in some states it's illegal for safety reasons to put a TV set in the front compartment.

But Ethyl has discovered how to bring TV commercials selling your best gasoline, right into the car. That is to show these commercials in drive-in theatres. Judging from results, it's an excellent way to sell petroleum products.

During the past three summers, we used more than 500 drive-in theatres to supplement the coverage of our TV shows. Our minute movies reached an estimated weekly audience of 3,350,000 in 1953. But more important than coverage figures was the strength of the impression left with car owners.

(Continued on next page)

ETHYL
ETHYL CORPORATION

Printed in U. S. A.

TV in automobiles?

(*Continued from preceding page*)

We checked with service-station operators within a reasonable driving range of individual theatres after the showing of our films. Again and again we were told premium sales had gone up and that many people mentioned having seen the Ethyl films.

In fact, these films proved so successful in influencing motorists outside the TV areas that we are including selected drive-in theatres in our 1954 advertising plans to help sell more "Ethyl" gasoline. We wondered if perhaps some of our friends in the merchandising and advertising end of the oil business might not be interested in hearing of this relatively new — but proved — way of selling petroleum products.

Ethyl's use of drive-in movies to help sell your best gasoline is another service we are happy to perform for our friends in the oil industry.

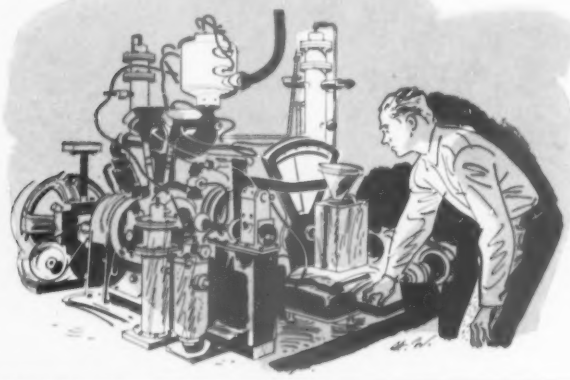
ETHYL CORPORATION

NEW YORK 17, NEW YORK

WORTH NOTING

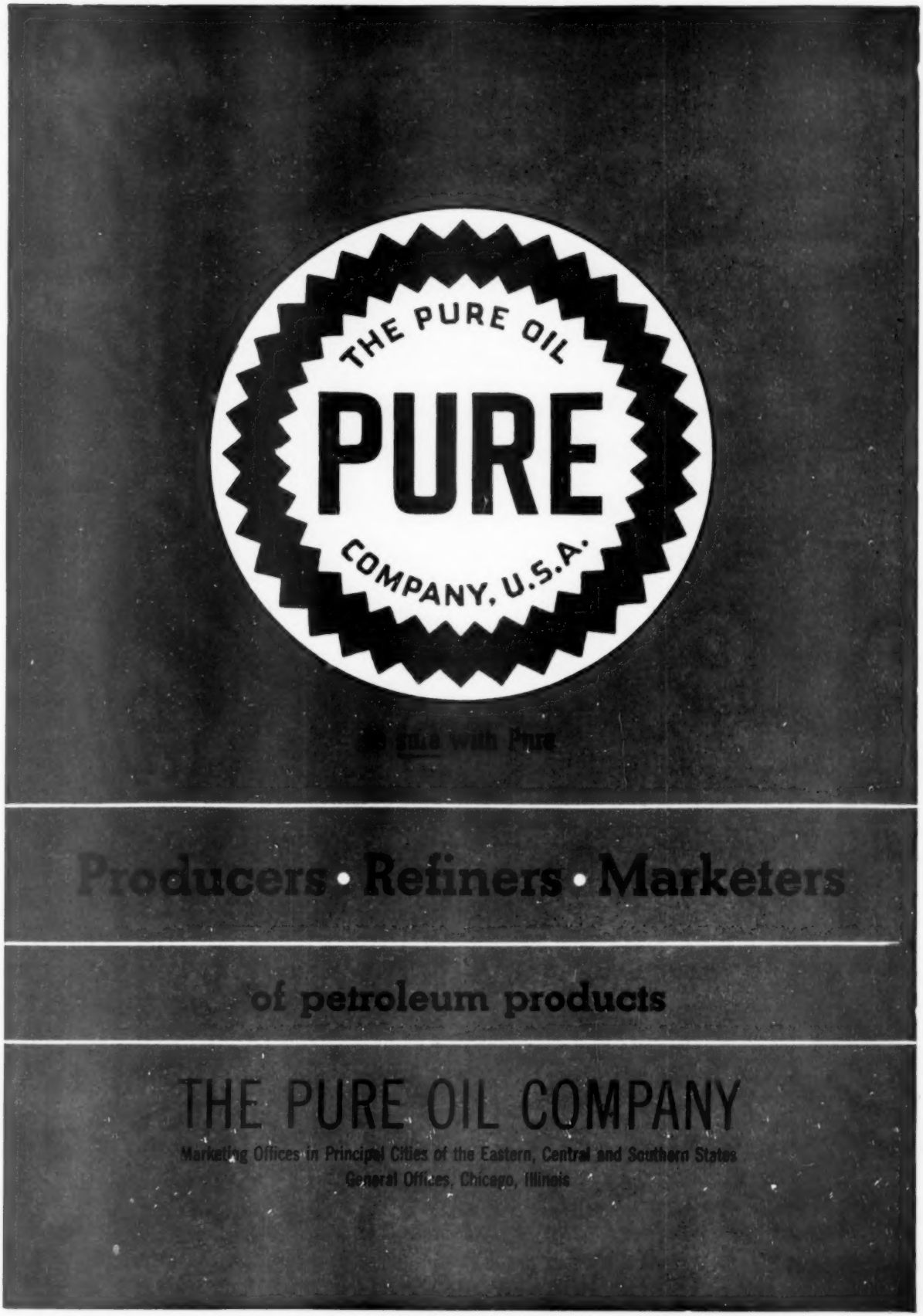
3,000 gallons of sea water must be treated to obtain just one pound of bromine for "Ethyl" antiknock fluid. And to keep Ethyl supplied with this chemical, Ethyl-Dow Corporation each day processes as much water as is used by Cleveland, Detroit, and St. Louis combined!

1953 was the 20th year of publication of the Ethyl "Brief Passenger Car Data" booklets . . . handy pocket volumes which give pertinent engine specifications on all late-model automobiles.



Over 250,000 test hours on aviation problems have been logged at the Ethyl Research Laboratories for the Armed Forces.

Ethyl Service is backed by 31 years of antiknock experience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Producers • Refiners • Marketers
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General Offices, Chicago, Illinois

This stem seat of plain carbon steel, removed from an Adjustable Wing Valve after only 45 days of service on a gas-condensate well, graphically illustrates the seriousness of corrosion.

After 7 years of continuous service on the same well, this stem seat of UNIBOLT "SA" Stainless Steel shows little, if any, harmful effect of the gas-condensate corrosion.

If CORROSION is your problem

UNIBOLT "SA" Stainless Steel Christmas Tree Fittings may provide the answer. For the past seven years, in cooperation with a major oil company, UNIBOLT engineers have experimented with various stainless alloys to determine the one most resistant to gas-condensate corrosion. The un-retouched photographs above of identical parts tested on the same well clearly indicate the wisdom of selecting UNIBOLT "SA" Stainless Steel Fittings for corrosive conditions.

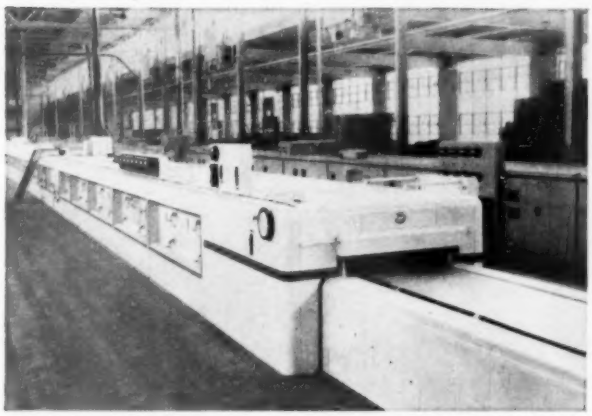
UNIBOLT "SA" STAINLESS*

THORNHILL CRAVER CO.

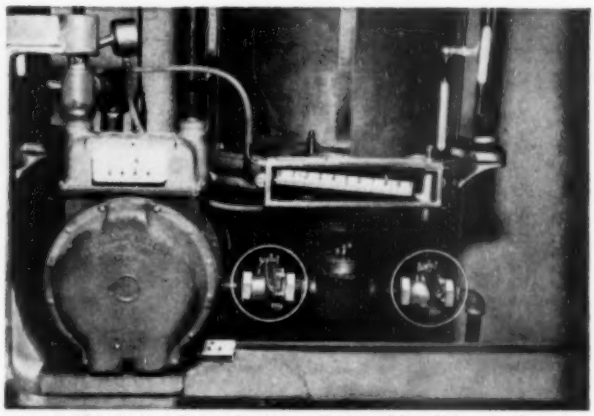
P. O. BOX 1184 HOUSTON, TEXAS

* Special Analysis, Special Heat-treatment

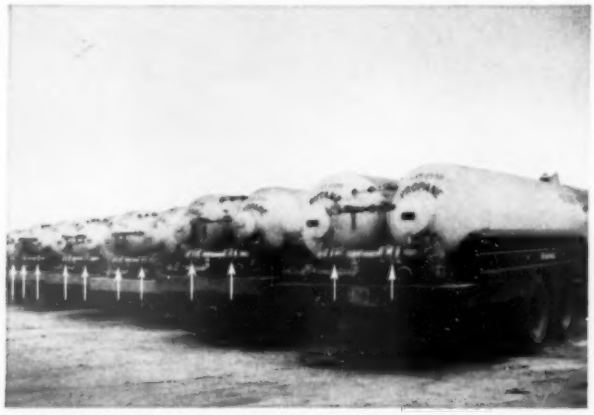
Do you need a LEAKPROOF VALVE?



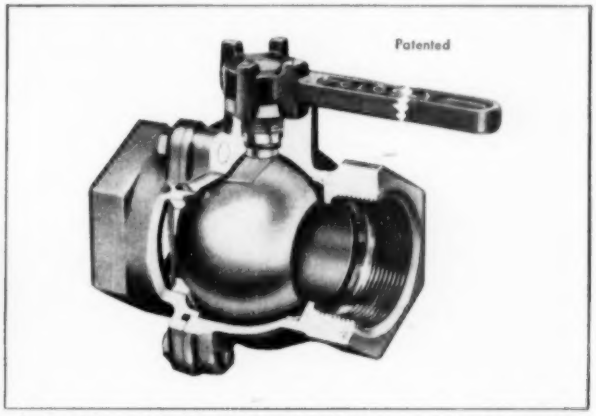
Leakproof in a Bakery where escaping gas and gas odor are a hazard. Rockwood Ball Valves, used in the ovens above, hold tight despite adjustment at various times to control flow of natural gas.



Leakproof on Air Lines Testing Gas Meters. Rockwood Ball Valves, used on air lines above, are opened and closed 1000 times a day, have completed two years' service without leakage, without maintenance.



Leakproof on LP Gas Trucks where flammable bottled gas must not escape. Rockwood Ball Valves, used on trucks above, prove not only leakproof but longer wearing at less cost. Fleet operator praises them.



Leakproof for a Longer Time. Rockwood Ball Valves are designed to operate under the roughest and most grueling of conditions. They pay for themselves over and over wherever they are in service.

Note these other exclusive features!

Full Round Flow — assuring fast, efficient operation, less friction loss.

Quick Opening and Closing — needs only ¼ turn even under full pressure.

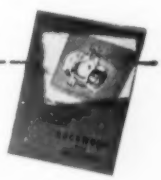
Resists Wear Longer — Chrome-plated bronze ball stands up under abrasion, pitting and scratching.

Rockwood Ball Valves are used in all types of applications throughout the petroleum field. Perform with trouble-free continuity. Longer time between replacements, less maintenance on the job. Comes in all pipe sizes. Tested and listed by Underwriters' Laboratories, Inc. The coupon will bring you complete information.

ROCKWOOD

THE FLOW IS AS ROUND AS THE PIPE ITSELF

***FULL-FLOW* BALL VALVES**



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Company.....

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De Laval IMO and CPO pumps have solved problems on a wide range of products—hot or cold, acidic or alkaline, viscous or corrosive, clear or filled with suspended solids. IMO and CPO models are available for early delivery.

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DE LAVAL *Pumps*

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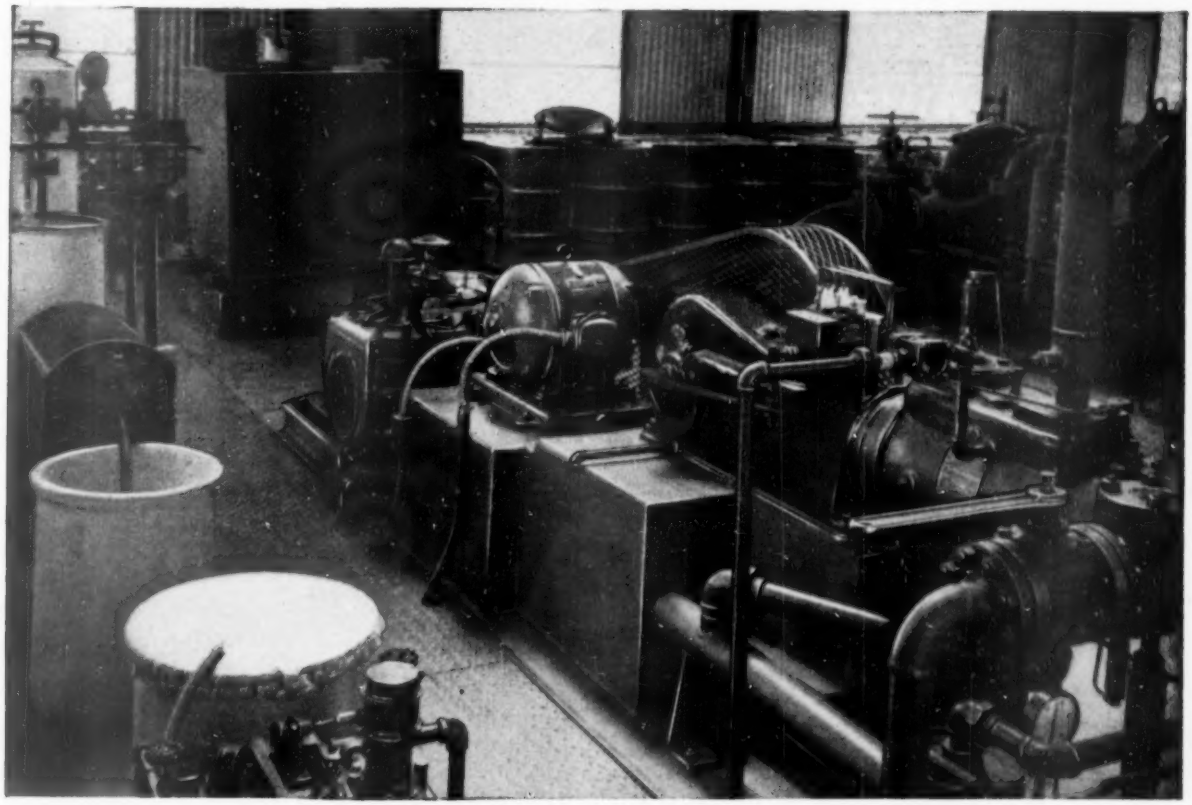
DL 336

Field tests prove **ARQUAD T-2C** cuts costs of secondary oil recovery and gives corrosion protection for your system!



Right here in the field, Armour's new Arquad T-2C has been tried, tested and *proved* by large petroleum producers. The results — over 95% corrosion protection reported in every case (in some cases, 99.5%) and complete control of sulphate reducers! Arquad T-2C also means less plugging of sands, less down-time for filter cleaning. And Arquad T-2C is an extremely *economical* corrosion inhibitor and bactericide — only 6 ppm does the job!

For free samples of Arquad T-2C and further information on all of Armour's Arquads (quaternary ammonium chlorides), send the coupon today! Technical Bulletin E-6, "Chemical Treatment of Oil Wells", and Technical Bulletin G-3, "Combat Corrosion", are also available. And remember that our research and development laboratory is equipped and ready to help you with your problems.

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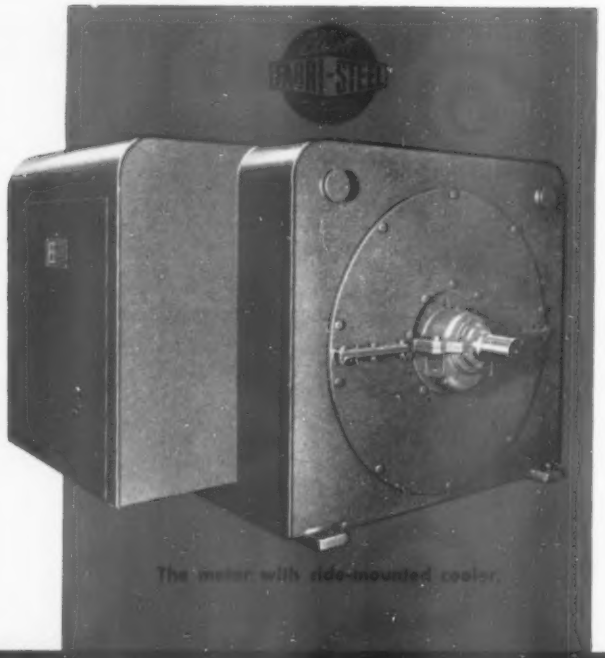
The economical selection for large motor installations in Class I Division II locations...



The motor with side-mounted cooler.

ELLIOTT INERT-GAS OR INSTRUMENT-AIR-COOLED MOTORS

These motors are the modern answer to the problem of motor installations above 900 hp in hazardous areas. They represent a substantial saving over the cost of explosion-proof design, the saving in the larger sizes approaching 30%. Furthermore in comparable sizes they provide greater overload capacity, and their size range well exceeds explosion-proof types, going to 4000 hp.

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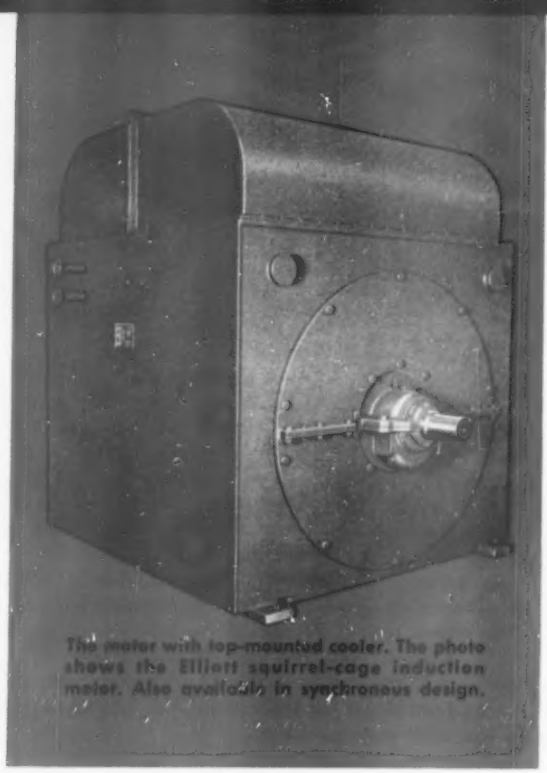
Your local Elliott field engineer has full details, or write Elliott Company, Ridgway Division, Ridgway, Pa.



The motor with top-mounted cooler. The photo shows the Elliott squirrel-cage induction motor. Also available in synchronous design.

ELLIOTT Company

R4-8

TURBINE-GENERATORS TURBINES MOTORS GENERATORS DEAERATING HEATERS EJECTORS CONDENSERS COMPRESSORS TURBOCHARGERS TUBE CLEANERS STRAINERS

They Say—

Gas-Tax Increase Favored

"At present, it seems that Attorney General John Ben Shepperd's proposal is the best. In addition to the present production tax of 5.72 per cent of market value at the well, he would add a tax of 1.5 cents per thousand cubic feet on dry or residue gas.

"This is proposed because the straight production tax has been upheld by the United States Supreme Court. And it seems to be in line with the suggestion in the current decision that a processing tax would be legal.

"Shepperd's second proposed bill, defining "waste" gas and aimed primarily at setting a minimum price of 10 cents a thousand cubic feet, might not stand the test of the court, however. Hence, the third "or standby" bill, setting an outright minimum of 10 cents a thousand cubic feet, would be advisable.

"An argument for this new tax can be found in the fact that it would put gas more nearly on the basis of its intrinsic value as a fuel. Gas has always sold too low on the basis of its heat-equivalent value with other fuels."

Editorial in the Dallas Morning News, Dallas, Tex.

The Pessimists Are Mistaken

"We find prophets of doubt still with us. Again there are predictions of an economic setback, although most are now forecasting that the setback will be relatively mild.

"In my opinion the pessimists are again mistaken. No depression is in my vision. It is my belief that the national economy will be strong and healthy throughout the year. . .

". . . There is one danger we must guard against—and that is psychological. If those who persist in taking a pessimistic view of the future succeed in planting fear in the minds of the public, those seeds of fear could take root and the result might be the very condition we seek to avoid."

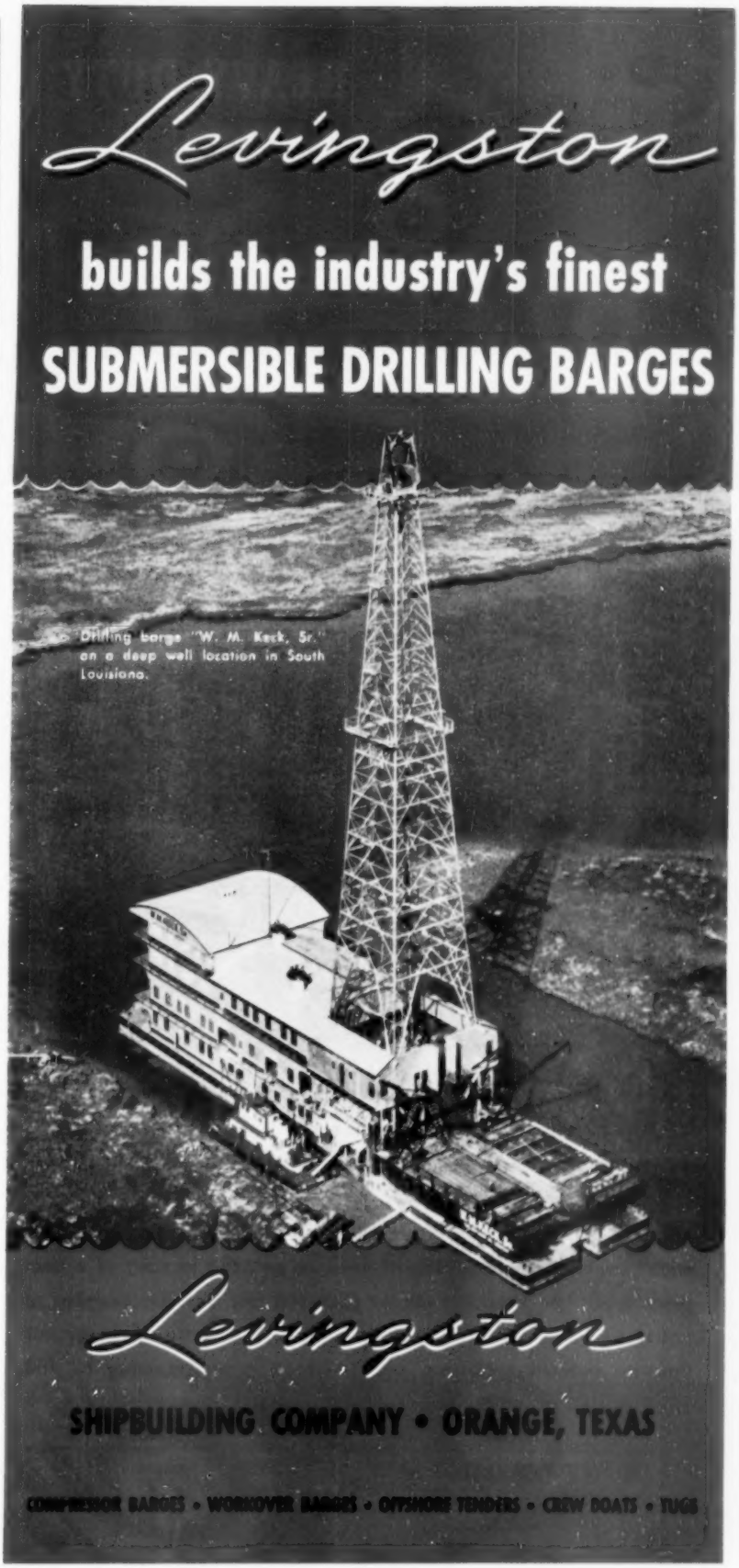
Harlow H. Curtice, president, General Motors Corp., in speech at G. M. Motorama.

CALENDAR

MARCH

1- 5 American Society for Testing Materials, spring meeting, Shoreham Hotel, Washington, D. C.

3- 5 American Petroleum Institute, Division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*Snap-on is the Trademark of Snap-on Tools Corporation.

of Production, Southwestern district, Rice Hotel, Houston.

4- 5 American Gas Association, transmission and storage conference, Jung Hotel, New Orleans.

8-10 American Institute of Chemical Engineers, Statler Hotel, Washington.

10-12 American Society of Mechanical Engineers, international meeting, Hotel Del Prado, Mexico City.

15-19 National Association of Corrosion Engineers, annual meeting, Municipal Auditorium, Kansas City, Mo.

16-17 Gas Conditioning Conference (formerly Gas Hydrate Control Conference), Extension Study Center, North Campus of the University of Oklahoma, Norman.

17-19 American Petroleum Institute, Division of Production, Mid-Continent district, Biltmore Hotel, Oklahoma City.

23-April 1 American Chemical Society, annual meeting, Municipal Auditorium, Kansas City, Mo.

24-26 American Power Conference, sixteenth annual meeting, Sherman Hotel, Chicago.

26 American Chemical Society and Sabine Area American Institute of Chemical Engineers, joint session, Beaumont, Tex.

29-31 Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

APRIL

4- 6 Texas Independent Producers and Royalty Owners Association, Rice Hotel, Houston.

5- 7 American Society of Lubrication Engineers, Netherland-Plaza Hotel, Cincinnati.

6 New Jersey Section of the Instrument Society of America, sixth annual symposium, Essex House Hotel, Newark, N. J.

6- 8 Petroleum Industry Electrical Association, annual convention and exhibit, Adolphus and Baker Hotels, Dallas.

7 Packaging Institute, annual spring luncheon, Hotel Dennis, Atlantic City, N. J.

8- 9 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Townsend Hotel, Casper, Wyo.

8- 9 Second annual instrumentation conference, Louisiana Polytechnic Institute, Ruston, La.

12-15 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, joint annual meeting, Kiel Auditorium, St. Louis.

13-15 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

14-16 National Petroleum Association, fifty-first semiannual meeting, Cleveland Hotel, Cleveland.

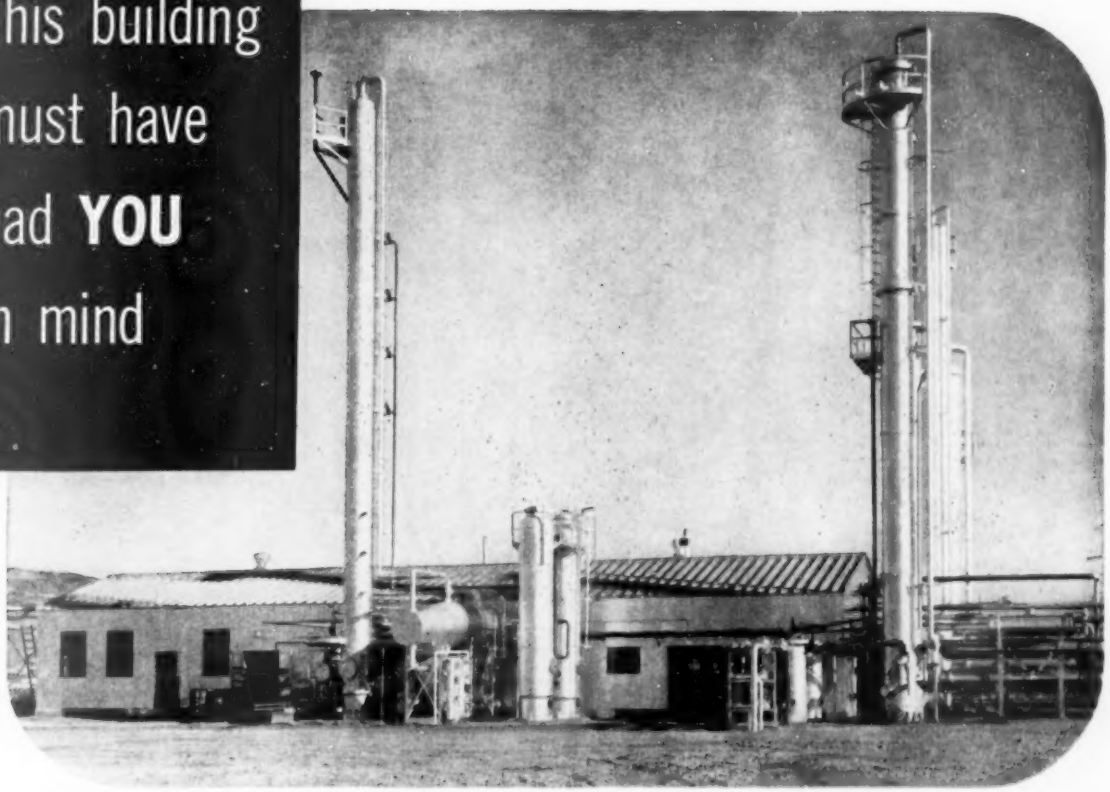
17 Fourth John Zink Process Heating Seminar, John Zink Burner Co. plant, 4401 S. Peoria, Tulsa.

19-21 National Purchasing and Stores Conference, sponsored by the American Gas Association, Atlanta, Ga.

20-23 Distribution, Motor Vehicles and Corrosion Conference, Operating Section, American Gas Association, Mount Royal Hotel, Montreal.

21-23 1954 Southern Industrial Wastes Conference, Manufacturing Chemists Association Southern Association of Science and Industry, and the Texas Chemical Council, Houston.

This building must have had **YOU** in mind



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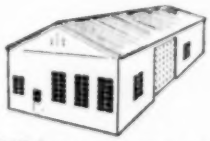
TYPE 2 Widths: 12′ to 28′. Heights: 8′ to 14′. Any length.



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21-23 Natural Gasoline Association of America, thirty-third annual convention, Baker Hotel, Dallas.

22 Illinois Oil and Gas Association, annual membership meeting, Hotel Emmerson, Mount Vernon, Ill.

26-28 Southern Gas Association, annual convention, Houston.

MAY

2- 4 Independent Petroleum Association of America, midyear meeting, Cosmopolitan Hotel, Denver.

3- 5 American Geophysical Union, thirty-fifth annual meeting, National Academy of Sciences, Washington, D. C.

3- 5 Air Pollution Control Association, annual meeting, Patten Hotel, Chattanooga, Tenn.

6- 7 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Statler Hotel, Los Angeles.

9-12 Liquefied Petroleum Gas Association, annual convention and trade show, Conrad Hilton Hotel, Chicago.

10-12 Ninth annual Purdue Industrial Waste conference, Purdue Memorial Union, Lafayette, Ind.

10-12 American Petroleum Institute, Division of Transportation, Products Pipe Line Conference, Warwick Hotel, Philadelphia.

10-13 American Petroleum Institute, Division of Refining, midyear meeting, Rice Hotel, Houston.

14-15 Interstate Oil Compact Commission, General Oglethorpe Hotel, Savannah, Ga.

16-19 American Institute of Chemical Engineers, Springfield, Mass.

17-19 American Petroleum Institute, Division of Marketing, midyear meeting, Cosmopolitan Hotel, Denver.

20-21 Kentucky Oil and Gas Association annual meeting, Lafayette Hotel, Lexington, Ky.

24-26 American Gas Association, production and chemical conference, William Penn Hotel, Pittsburgh.

27-28 Natural Gas and Petroleum Association of Canada, Prince Albert Hotel, Windsor, Ont., Canada.

31-June 5 American Petroleum Institute, Division of Production, midyear committee conference, St. Francis Hotel, San Francisco.

JUNE

2-4 Southern Gas Association, short course in gas technology, Texas College of Arts and Industries, Kingsville, Tex.

3- 4 Pennsylvania Grade Crude Oil Association, thirty-first annual meeting, Hotel William Penn, Pittsburgh.

6-11 Society of Automotive Engineers, summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

13-18 American Society for Testing Materials, annual meeting and exhibit, Sherman and Morrison Hotels, Chicago.

17-19 American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

20-24 Canadian Gas Association, Banff Springs Hotel, Banff, Alta., Canada.

25-26 Southern Gas Association, transmission management conference, Hotel Adolphus, Dallas.

27

July 1 Petroleum Equipment Suppliers Association, nineteenth annual meeting.

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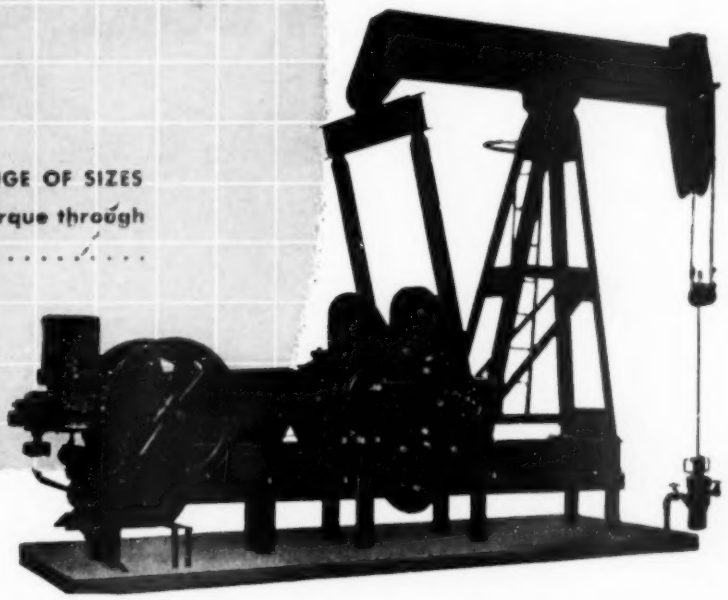

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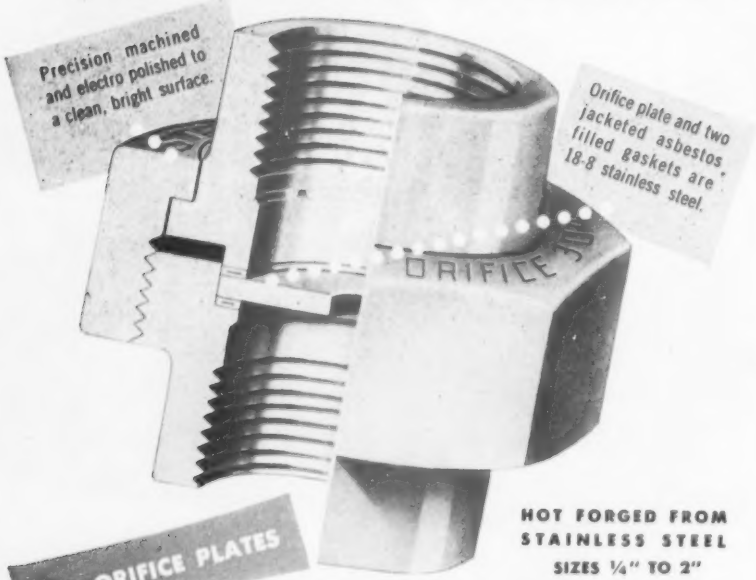
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JULY

23 Southern Gas Association, communications conference, Rice Hotel, Houston.

24 Southern Gas Association, dispatchers' conference, Rice Hotel, Houston.

AUGUST

17-19 Society of Automotive Engineers, Inc., international West Coast meeting, Georgia Hotel, Vancouver, B. C., Canada.

20 Southern Gas Association, natural-gas processing conference, Herring Hotel, Amarillo, Tex.

21 Southern Gas Association, pipe-line operations conference, Herring Hotel, Amarillo, Tex.

SEPTEMBER

7-9 Association of Desk and Derrick Clubs of North America, annual convention, Banff Springs Hotel, Banff, Alta.

9-11 Interstate Oil Compact Commission, Omaha, Neb.

12-16 American Institute of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.

15-17 National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.

16-17 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

25 Southern Gas Association, compressor-station conference, Captain Shreve Hotel, Shreveport, La.

OCTOBER

2 Southern Gas Association, right-of-way conference, Peabody Hotel, Memphis, Tenn.

4-6 Texas Mid-Continent Oil and Gas Association, annual meeting, Plaza Hotel, San Antonio, Tex.

7-8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.

9 Southern Gas Association, field production of natural gas roundtable, Rice Hotel, Houston.

11-13 American Gas Association, annual convention, Atlantic City, N. J.

11-13 American Association of Oilwell Drilling Contractors, annual meeting, Biltmore Hotel, Los Angeles.

12-15 Eighth National Chemical Exposition, Chicago Coliseum, Chicago.

14-17 Permian Basin Oil Show, Odessa, Tex.

16 Southern Gas Association, transmission management conference, Rice Hotel, Houston.

17-20 American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.

24-26 Independent Petroleum Association of America, annual membership meeting, Mayo Hotel, Tulsa.

26-27 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.

NOVEMBER

4-5 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.

8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

28-Dec.

3 American Society of Mechanical Engineers, Statler Hotel, New York.

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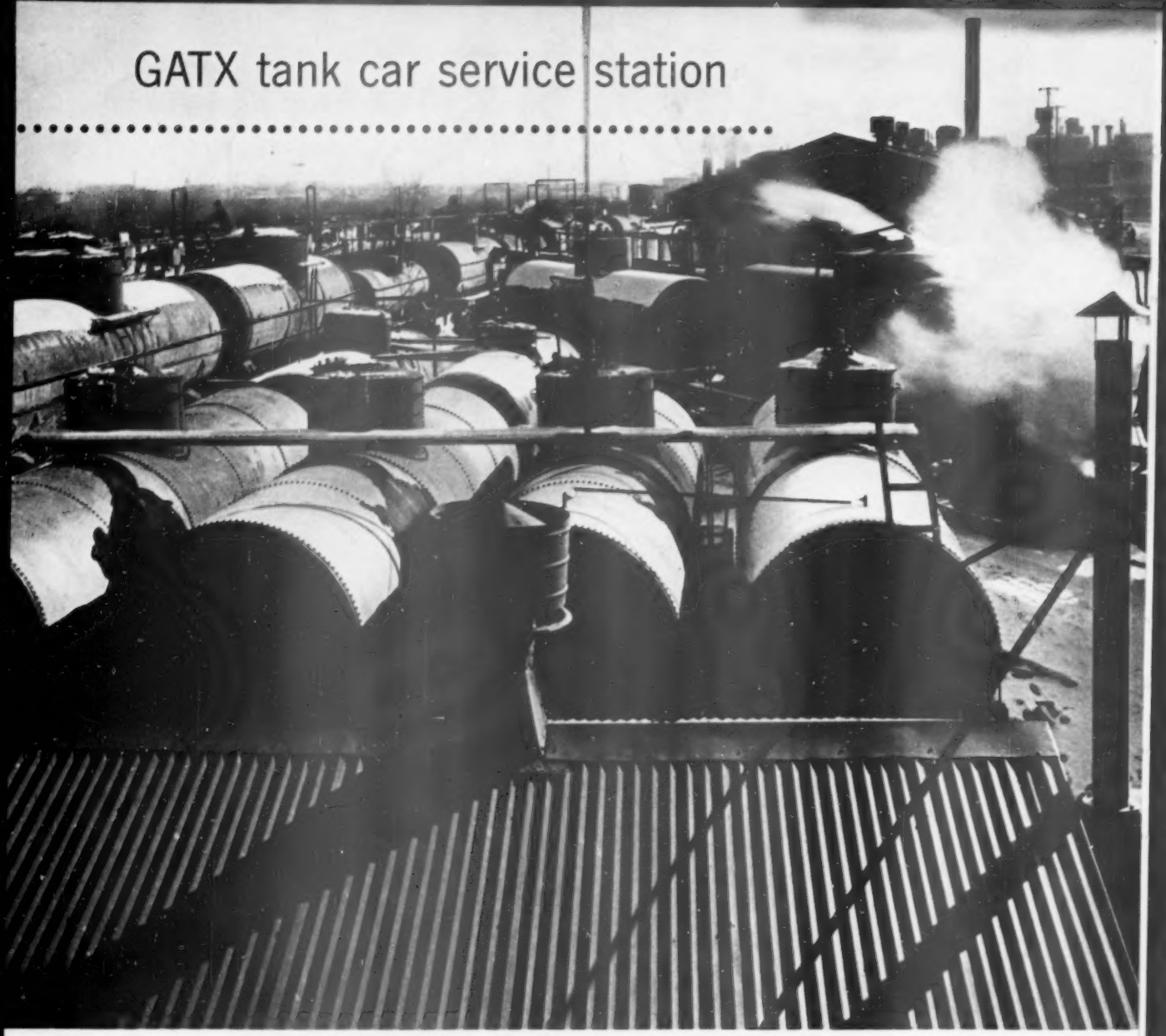

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THE OIL AND GAS

JOURNAL

TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

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JOURNALLY Speaking

Courage, Digboi

THE oil-discovery rate in India apparently has been somewhat disappointing, for Assam Oil Co., Ltd., has enlisted the aid of our favorite oil publication to boost the morale of its employes by convincing them that oil is hard to find even deep in the heart of Texas.

The February issue of the Digboi Batori, Assam's house organ, carries a picture of part of a page from the exploration section of the Big Yellow Book listing the results of wildcat completions in Texas during a recent week. The portion reproduced showed only 2 successful strikes but had 16 dry holes ringed with heavy pencil, and Batori's editor explained:

"Even in oil-rich U. S. A., birthplace of the petroleum industry, nine failures, or 'dry holes' as they are called, are drilled for every success. And some of the 'successes' don't last long, either.

"If you have any doubt about this, look at this report, which we have reproduced photographically from the pages of an American oil journal widely read in the industry (The Oil and Gas Journal, naturally—Ed.).

"This shows the results of test wells recently drilled in the search of oil in Texas—the leading petroleum state in the U. S. A. Americans call these test wells 'wildcats'.

"The little black rings give the facts—dry holes almost everywhere. Some of these were quite deep holes, and many were drilled by companies whose names are famous in oil industry circles. Think what the results would have been like for amateur, unguided drilling! And remember that all the wells in this report penetrated a region on the earth's crust known to be rich in oil.

"Page after page of the oil journal tell a similar story every month (darn it, doesn't he know we're a weekly?—Ed.). Scores of dry holes; very occasionally a strike of oil."

Take heart, friends. Texas may have no more oil than India—just more optimistic willingness to drill for it despite the odds.

Pueblo El Paso

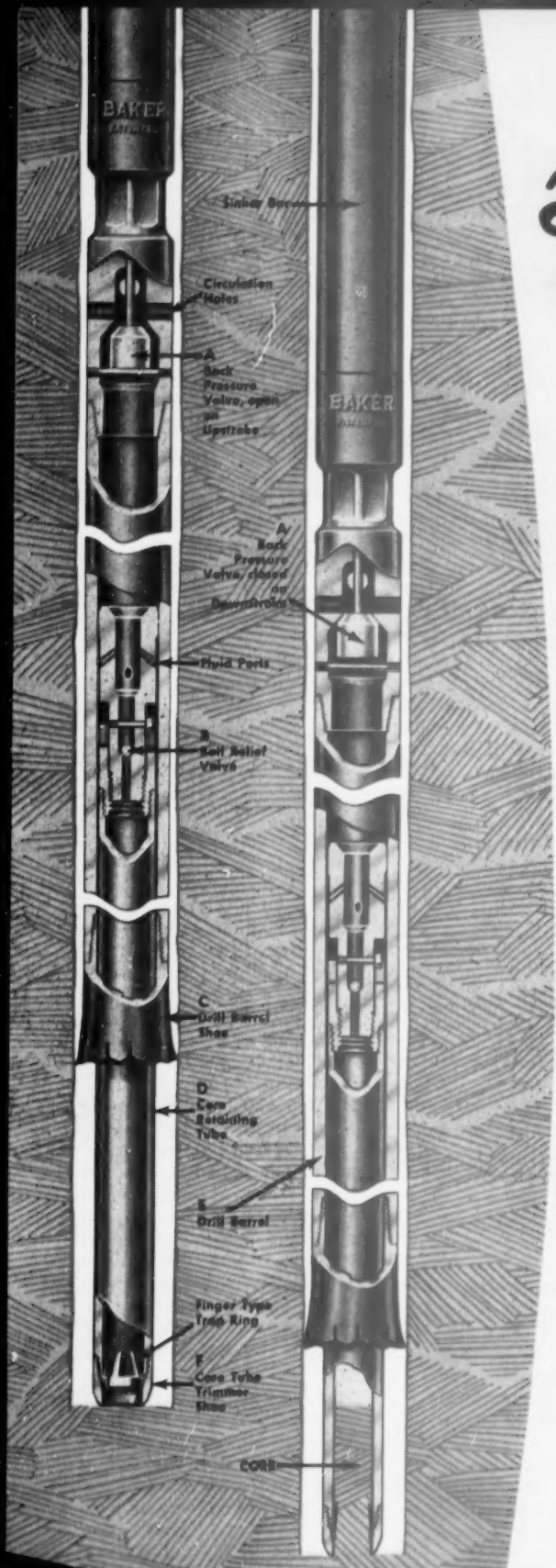
SOMETHING new is always turning up in this industry, but El Paso Natural Gas Co. turned up some pretty old things while laying a new pipe line across New Mexico and Arizona. Its ditchers turned up a whole museum full of ancient Pueblo Indian relics, together with much valuable information about pre-Columbian civilization in that region.

Since the line crosses a good deal of federal land, an archaeologist from the National Park Service scouted the right-of-way with the survey party and found evidence that the line would cross the sites of several prehistoric cities. So the company hired a crew of archaeologists and set them digging. Then when the bulldozers and ditchers came along they kept an eagle eye on the excavations and sifted the dirt for artifacts.

What they found throws much new light on a great civilization that flourished in the Southwest 1,000 years ago. There were primitive people there from the beginning of the Christian era until about 500 A.D., expert weavers and basket makers but with no knowledge of pottery or architecture. From 900 to 1250 was the great period of the Pueblo civilization which produced fine pottery and cities with multistoried apartments housing as many as 800 people. Then something happened and the Pueblos began to decay and disappear. Nobody knows whether this was due to drought, plague, enemies, or emigration, but when the Spanish conquistadores came through in the 1500's the Pueblos and their culture were almost extinct.

Stockholders and auditors may raise eyebrows over archaeologists on the payroll, but El Paso Natural has the satisfaction of knowing that it contributed to the Southwest's ancient history while helping to build its industrial history. Here's confirmation of the old saying that a new civilization builds on the ruins of an old.

—Henry D. Ralph.



attention!

CABLE TOOL OPERATORS

WHEN YOU WANT CORES that are a true, uncontaminated, maximum size sample of the formation, at low cost, nothing can equal the BAKER CABLE TOOL CORE BARREL.

This efficient coring device not only meets the requirements of the geologist, but also is extremely popular with both operator and crew because of its simplicity of operation, and its "holemaking" ability. There are no complicated adjustments, and any experienced cable tool driller can *secure good cores* and *maximum footage right from the start.*

Coring with a Baker Cable Tool Core Barrel is extremely economical, with operating and maintenance costs held to a minimum. With proper care, this Core Barrel will last indefinitely, and replacement or re-building of the few wearing parts is necessary only after prolonged service.

Advantages of Coring with the Baker Cable Tool Core Barrel

Cores up to $2\frac{13}{16}$" in diameter, and up to 7 feet in length are readily taken from a wide variety of formations.
The accurate, uncontaminated cores eliminate danger of passing through low-pressure sands that might prove productive.
Tests for porosity, saturation and permeability can be made without difficulty, and *positive proof* of the *exact character* of any sand is ensured. And all of these advantages are secured with little loss of drilling time, as a Baker Cable Tool Core Barrel takes perfect cores at a speed comparable with straight drilling.

Strong and Long Lasting—Easy to Operate

The sturdy construction consists of an outer Drill Barrel (E) and an inner Core Retaining Tube (D). The Trimmer Shoe (F) remains in contact with the formation until the core is taken, after which the entire Core Barrel (with core intact) is removed from the well.
The Drill Barrel (E) slides along the Core Retaining Tube (D) and cuts away the formation, thus permitting the Core Retaining Tube to follow down over the undisturbed core and secure a true sample of the formation.

Features which assist in taking good cores include: the Ball Check Valve (B) which permits escape of water entrapped in the Core Retaining Tube so that fluid under pressure never acts on the core; also, the Back Pressure Valve (A) which closes on the downstroke so that water in the annulus between the two Barrels is driven downward with sufficient force to keep the teeth of the Drill Barrel Shoe (C) free from cuttings.

ANY BAKER REPRESENTATIVE, or office, can furnish additional details on this efficient, low-cost Core Barrel, which provides many advantages in cable tool drilling.

BAKER OIL TOOLS, INC.
HOUSTON • LOS ANGELES • NEW YORK

BAKER

Product No. 520

CABLE TOOL CORE BARREL

Integrated or not, oil is a single entity

A 3-YEAR study by two Harvard professors has confirmed what has always been well known within the industry itself, namely, that the various segments of the oil industry are so interrelated and so interdependent that they cannot be compartmented as separate industries but must be considered together as one big integrated entity.

After a most comprehensive study of the nature and history of the industry, just published as a 738-page volume entitled "The Growth of Integrated Oil Companies," the two professors concluded that integration is natural and appropriate.

In many other lines, textiles for example, the operation of raw-material production, manufacture, transportation, and distribution are so specialized, or so separate, or so mixed up with other businesses that vertical integration is impractical or offers no economic advantage. There, each function is a separate industry.

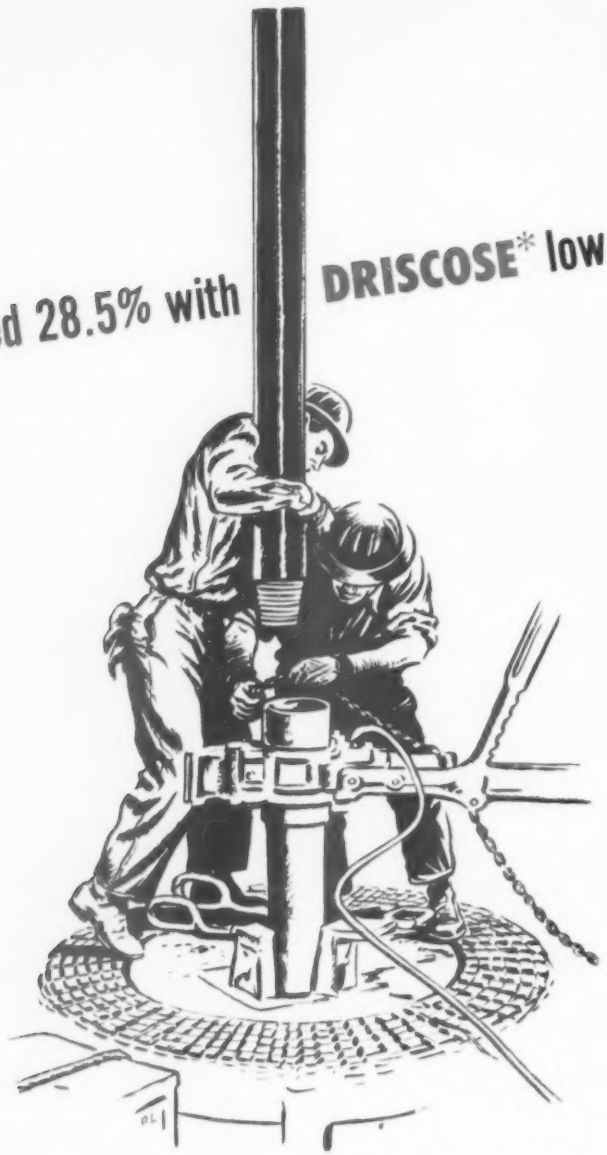
BUT in oil, these functions are so dovetailed that dozens of companies gradually grew from one division of the industry into two or three others without any deliberate plan or intent. And the researchers uncovered several instances of oil companies taking positive and sometimes drastic steps to keep from becoming integrated or to disintegrate themselves when they felt it to their advantage to confine their operations to a single division.

The fact that there are prosperous unintegrated independents in every division of the oil industry, most of them unintegrated by choice, does not destroy the thesis that all the divisions are closely related and interdependent. There is plenty of room for such independents in what the Harvard study calls the interstices of the industry—provided these operators do a specialized job better and provided they keep their operations closely geared to conditions in other parts of the industry.

The oil industry, the study concluded, is a living organism, highly fluid, ever changing, extremely competitive, constantly altered by technological developments, and continually influenced by shifts in the pattern of supply and demand. Under such conditions, no segment can remain isolated from the rest, whether or not there is corporate integration.

MANY conclusions can be drawn from this Harvard study, but the outstanding, all-pervading one is that for all its diversity the oil industry must be viewed as a single organism. Every function, every occupation, is affected by developments in some other division or area. That has always been the view of The Oil and Gas Journal.

Rig Time Reduced 28.5% with DRISCOSE* low solid emulsion!



It wasn't just luck that effected a 28.5% saving in drilling days in this well in West Texas. Four wells were drilled in the same field under practically identical conditions. In three of these wells conventional mud was used. The fourth well . . . using a **DRISCOSE** low pH, low solid emulsion . . . showed significant savings in rig time and also in the number of bits used. Write for information about **DRISCOSE.** See how it can help you get easier, faster penetration in your drilling area.

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BARTLESVILLE, OKLAHOMA

*DRISCOSE is a trademark for Sodium Carboxymethylcellulose.

THIS WEEK... ...IN THE NEWS

GOVERNMENT—Congress now appears to be ready to approve undertaking the St. Lawrence Seaway after half a century of agitation for the inland waterway project. . . . Big push in that direction is being furnished by knowledge that Canada is ready to undertake the project now—with or without U. S. participation. . . . ¶The revived Oil and Gas Division of the Interior Department will have expanded duties with a smaller staff when it takes over the duties of the expiring Petroleum Administration for Defense. . . . ¶U. S. Geological Survey plans to open offices in Houston and New Orleans because of expected increased exploration on Gulf's Continental Shelf. . . . ¶Senate committee approves proposals to give gas industry right of eminent domain to acquire underground storage facilities. . . .

PIPE LINES—Houston Texas Gas & Oil Co. expects to submit modified plans within 90 days to the Federal Power Commission for the first of two 30-in. natural-gas lines. . . . One line is planned from East Texas to Duluth, Minn., and the other from South Louisiana to New York City by way of the eastern seaboard. . . . J. O. Mack, president of the company, declined to identify producers who have committed reserves or utility companies which have contracted for the gas from the lines. . . . NNCW Pipe Line Co. plans construction of a 127-mile crude line from Weston County, Wyoming, to Casper. . . . ¶Trans Mountain Pipe Line Corp. will begin construction May 1 on facilities to link the Canadian pipe line with General Petroleum Corp.'s refinery now under construction at Ferndale, Wash. . . .

SECOND MAJOR EXPANSION of the Elk City, Okla., natural-gasoline and cycling plant is well past the halfway mark. Being hoisted into place here is a 62-ft., 96-ton absorption column which will increase the plant's gas-intake capacity from 150,000,000 cu. ft. to 225,000,000 cu. ft. per day. Already in place is a 100-ft. fractionating column for stabilizing gasoline. Shell Oil Co. is operator of the Elk City gas-distillate field and the plant. More than 17 companies and 700 royalty owners are participants in the Elk City unit.

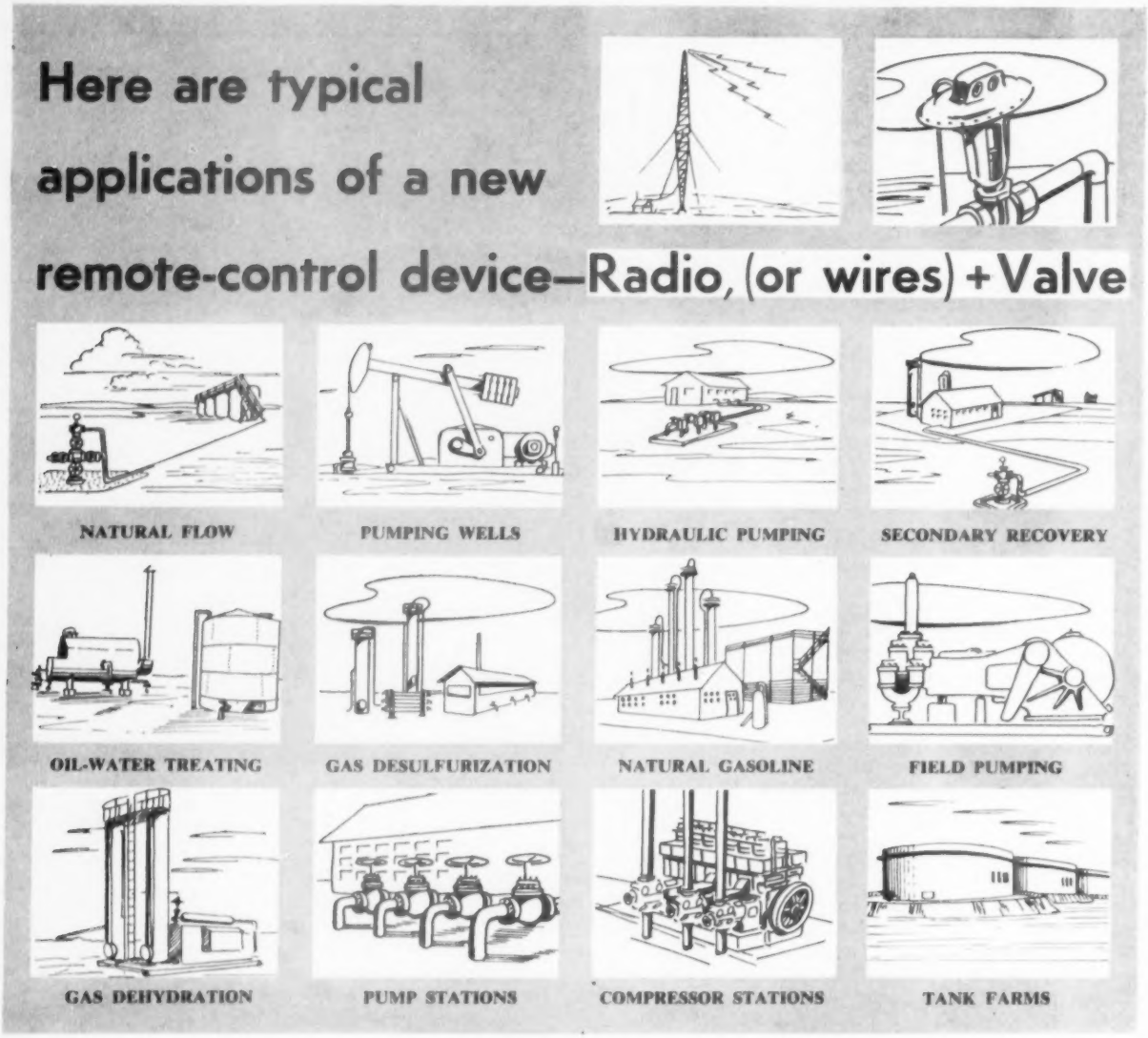
INTERNATIONAL—Both Venezuela and the Middle East set new production records in December to push 1953 world oil production to 11,832,000 bbl. and outrun predictions for the year's output. . . . ¶British insistence on a 50 per cent share in Iran's oil for Anglo-Iranian is slowing progress on settlement discussions. . . . British want lion's share but Americans think such a division would bring on nationalistic Iranian objections. . . . ¶Five new organizations plan exploratory programs in eastern Australia. . . . ¶A new trade agreement between Russia, Romania, and Egypt will give the Soviet cotton from Egypt in exchange for Russian and Romanian oil products. . . .

ACTIVITY—Production of crude and lease condensate averaged 6,305,875 bbl. daily for week ended February 27, down 14,500 bbl. daily. . . . ¶Total well completions for the week increased 87 wells to 999. . . . Wildcat completions gained 17 wells to 191. . . . ¶Rotary rigs operating in the United States totaled 2,488 rigs on March 1 compared with 2,518 a week earlier and with 2,428 on the corresponding date last year. . . .

TRENDS—Combined stocks of the four major products increased 1,026,000 bbl. for week ended February 27 for the first net increase of the season. . . . The first increase last year was for week ended April 11, and in 1952 the first net gain was for week ended March 22. . . .

REFINING—A 3,000-bbl. alkylation unit put on stream by Eastern States Petroleum Co., Inc., at its Houston refinery utilizes the largest "cascade type" reactor ever used. . . . The new alkylation unit uses the Kellogg process and is part of a $50,000,000 expansion program undertaken during the past 3 years at one of the largest independent refineries on the Gulf Coast. . . . ¶Pan-Am Southern Corp. says the Model IV cat cracker has proved itself at its Destrehan, La., refinery. . . . Data released by Pan-Am indicates the unit operates at an average conversion of 56.3 per cent of fresh feed charge of 14,300 bbl. of 29.9°-gravity virgin gas oil per stream day. . . . ¶Shell Chemical Corp.'s Epon resin plant at Houston goes on stream.

DRILLING—Gas drilling in the San Juan basin speeds drilling rates as much as 85 per cent and results in savings of $20,000 per well the American Petroleum Institute's Division of Production is told at a Houston meeting. . . . ¶Scale model of new "Sea Bat" drilling barge is patented by Alonzo L. Smith, president of Petroleum Instrument Co.



Automation in the Oil Fields

Kenneth B. Barnes

HOUSTON.—A new series of "electric operators" can be fitted to oilfield valves, to chokes on christmas trees, to pipe-line manifolds, to plant piping hookups, and the like. These valves or chokes then can be remotely operated by wired circuits or FM radio.

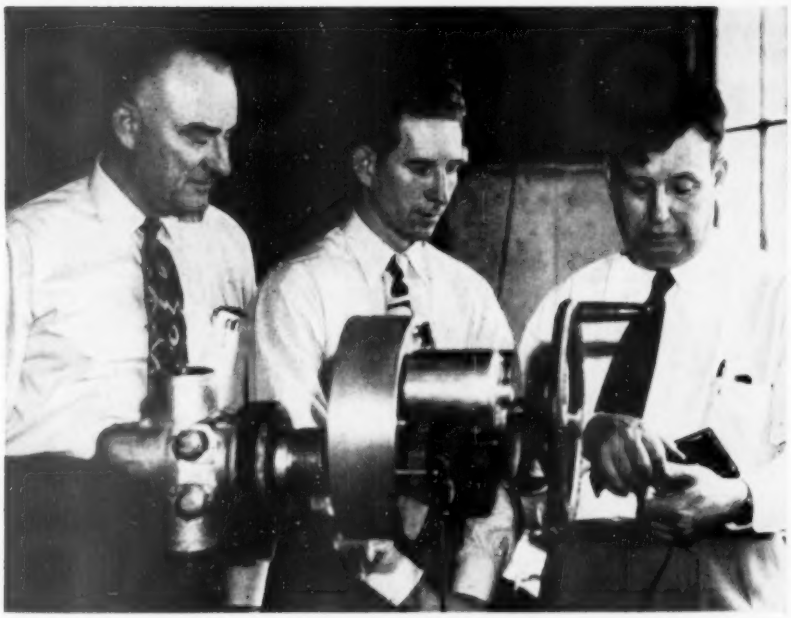
The first of these basic units is now being prepared for production and is being tested here by McEvoy Co. The design and development work of this new potential electrical robot for oil field and plant use has been done by Magnetic Industries, Inc., also of Houston.

Heart of the mechanism is an electric motor and gear train which serves to actuate the valve stem and open the valve. In the various possible future applications, such as a proportional choke setting for a flowing well, or valves in process applications, the "electrical operator" is in fact a mechanical-servo actuator.

On the full-size valves now fitted and being tested by McEvoy Co. and Magnetic Industries, the operating hookup is as follows: The electric motor and gear train is fitted to a 2-in., 4,000-psi. test valve; the motor itself is a 0.035 hp., 110 volt, 60 cycle unit. This small motor turns the multicomponent gear train and opens the valve. On the the model being tested, 100 seconds is required to fully open the valve.

As the electric motor turns the gear train and opens the valve, a heavy-duty clock spring on the assembly is wound into tension, or energized. When the valve reaches the full open position, a limit switch stops the motor.

When fully open, the valve is held open by a solenoid; in event of power failure the spring will automatically close the valve (e.g., the operation is "fail safe.") Also the valve may be



A TURN OF THE DIAL on the little black box will automatically open or close this valve. During the tests pictured, the operating pressures were alternated between zero and 4,000 psig. Left to right, are C. F. Johnson, sales manager, McEvoy Co.; H. H. Williams, president, Magnetic Industries, Inc.; and Dr. H. M. Zenor, head of research, Magnetic Industries, Inc.

operated manually. The 2-in. valve model now being tested will close in approximately 20 seconds.

While an electric motor will probably be used in most instances, the gear train can be actuated by an air, or gas, pressure motor, or even a hydraulic power accumulator unit. In future models of the electrical type a remote indicator will be incorporated in the circuit to show whether the valve is in open or closed position.

Applications . . . Remote control of sprawling, widespread, oil field installations can have the advantage of a moderate initial capital investment relieving higher-priced day-by-day supervisory and operating personnel, and permitting them to carry on other duties more profitable to company operations. Some typical oil field and plant operations that can be instrumented for at least partial "robot" control are pictured in the accompanying chart; the automatic valves can be operated by electrically wired circuits or FM radio (subject to FCC permits).

Magnetic Industries, Inc., are now designing chokes and valves which may be controlled "proportionally," e.g., to any desired partial flow opening. This electronics company for several years has been building power systems on U. S. Navy contracts, wherein the firm's principal products are magnetic amplifier units. Applicable to the oil-field control systems, the magnetic amplifier units can handle power applications from a small fraction of a watt up to heavy power loads.

Personnel of Magnetic Industries include H. H. Williams, president, R. V. Beeson, mechanical engineer, and Dr. Hughes M. Zenor, head of research. Zenor, prior to World War II, was with Humble Oil & Refining Co., and designed Humble's under-water gravimeter. Used for offshore oil exploration work, this gravimeter also is remotely controlled. During the war, Zenor was with Sperry Gyroscope Co. and engaged in design and radar units, automatic pilots and balancing gyros. McEvoy Co. has taken over from Magnetic Industries the manufacturing, distribution, advertising and sales of the new remotely controlled electric valve positioner systems.

Vasen Convicted, Sentenced

CHICAGO. — George Vasen, who promoted and drilled one of the deepest holes in the world, has been convicted of mail fraud in connection with the promotion of funds to drill the well.

Vasen has been sentenced to 5 years in prison, 5 years of probation to begin after the prison term is completed, and fined $25,000. He was convicted on nine counts, including violation of Securities and Exchange Commission regulations. He had been accused of defrauding around 300 persons of about $2,000,000.

Vasen's well, the 1 Fee, 9-2s-11w, in Stone County near Wiggins, Miss., was temporarily abandoned June 3, 1953, at a total depth of 20,450 ft. Spudded in late 1946, the well had been suspended several times and when it reached its total depth was within 71 ft. of establishing a new world's drilling-depth record.

Wafra Oil Landed

Culberson hits imports as Aminoil shipment arrives

AUSTIN Tex. — Fresh concern over the foreign-oil imports situation was voiced here last week by Olin Culberson, chairman of the Texas Railroad Commission

The occasion was the recent unloading at Houston of the first cargo of crude to reach a Texas port from the newly discovered Wafra field in the Saudi Arabia-Kuwait Neutral Zone. The crude was shipped by American Independent Oil Co. to Eastern States Petroleum Co.'s Houston refinery.

Culberson said the incident emphasizes the competition which domestic producers face from abroad. He said he could not criticize the purchasing company because it is "only doing the same thing that major importers have been doing on the East Coast."

Some refiners, Culberson said, have been having trouble buying United States crude even in the face of plenty. "Reduction of crude allowables on the part of the United States only makes room for more imports of foreign oil," he said.

The Neutral Zone cargo consisted of 105,000 bbl. of crude. R. B. Kahle, president of Eastern States, said the first shipment was entirely an "experiment" but pointed out that the operation might well develop into a long-term contract deal.

The crude was sufficient for 2 days' operation at Eastern States' refinery, which has 50,000 bbl. daily crude-charge capacity, including 22,000 bbl. vacuum distillation.

Another Eastern States official said the Middle East crude was not purchased because oil was not readily available, but because the company's policy is to purchase the best oil at the cheapest price in order to operate its refinery profitably.

The company has been running Mexican crude oil for a number of years, as have a number of other Gulf Coast refiners, who have also run Venezuelan crude. Eastern States crude runs have been composed of up to 30 per cent Mexican oil at various times.

Big Plans Modified

Mack says FPC will be asked to approve first of two big gas lines within 90 days, with second to follow shortly

William P. Sterne

HOUSTON.—Plans for the first of two big-inch gas lines from the Gulf Coast northward and eastward may be submitted to the Federal Power Commission within the next 3 months.

The lines, both 30-in., are planned by Houston Texas Gas & Oil Co. One would run from East Texas to Duluth, Minn., via Chicago. The other would take South Louisiana gas to New York City via a long, Central Florida-Georgia detour.

Plans were first announced a year ago *(The Oil and Gas Journal, March 2, 1953, page 37)*, but have since been modified *(see map)*.

J. O. Mack, president of the Houston company, said plans for one of the two lines will be laid before the FPC within 90 days and as soon as that project is under way a certificate will be sought for the other.

Mack said "plenty of gas and plenty of markets" have been obtained to support both projects. He declined, however, to identify any major producers who have committed reserves or any utility companies which have contracted for the purchase of gas. Mack said his company expects to file first for the Texas-to-Minnesota line.

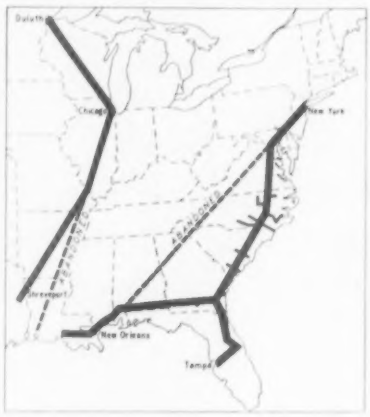
The two projects would cost more than $337,000,000, with the New York line costing an estimated $178,438,000 and the Minnesota line $158,733,000. Each line would have eight compressor stations and a daily throughput capacity of 450,000,000 cu. ft., which later could be increased by additional stations to 550,000,000 cu. ft.

Mack said financing has been almost completed and steel sources are being lined up. Construction would require about 18 months on each line, he said.

Plans changed . . . Original plans called for terminating the western line at Chicago, transporting gas from fields in the lower Rio Grande Valley.

It was decided, Mack said, that there would be a bigger market if the line were extended to Duluth. Gas supply has since been lined up in East Texas and northwestern Louisiana, he said, and the line will originate there. The company has dropped plans for a 30-in. leg from Lake Charles to a tie-in point with the Texas-Chicago line on the Missouri-Illinois border.

The major portion of the eastern line was rerouted, Mack said, because



studies showed there was "no necessity" for gas service on the original route. In addition to moving the big artery eastward, the plan now visualizes a 30-in. leg down Florida to Tampa and over to Orlando and Jacksonville. The main line would run northward, passing west of Washington, D. C., and then proceding to the New York metropolitan area, passing near Philadelphia.

Organization . . . Mack, Houston, Texas Gas & Oil president, also is president of H. & C. C. Oil Co. and Oil Well Processing Co.

Frank Roder Smith, New Orleans, former executive vice president of Higgins Shipbuilding Co., is vice president and a director; Allen R. Kleinkauf, Houston, is vice president and a director and executive assistant to the president; H. S. Mack is secretary-treasurer and a director.

Directors also include H. C. Cockburn, president and owner of Cockburn Oil Co., and L. A. Cage, Taft, Tex., independent and president of Cage Production Co.

Gas-Drilling Boost

Large savings possible in many cases, speaker says

HOUSTON.—Use of air or gas as a drilling fluid in the San Juan basin contaminates the producing zone less than mud, allows testing of low-pressure zones during drilling or cleaning out, and speeds drilling rate as much as 85 per cent, the southwest district of the American Petroleum Institute's

Turkish President Visits Magnolia Laboratories

Celal Bayar, president of the Republic of Turkey, and an entourage of about 40 Turkish and American dignitaries visited the Magnolia Petroleum Co. field research laboratories in Dallas during the Turkish president's recent 27-day tour of the United States. Shown here inspecting cores from the Ellenburger formation of Pegasus field of West Texas are (left to right) J. L. Latimer, Magnolia president; Feridum Erkin, Turkish ambassador to the U. S.; Bayar; Orhan Eralp, member of the Turkish diplomatic corps and Bayar's official interpreter; D. H. Clewell, laboratory director, and George C. McGhee, Washington, formerly U.S. ambassador to Turkey.

Division of Production was told here last week by L. S. Fuller, El Paso Natural Gas Co., Farmington, N. M.

Air drilling is particularly applicable where lost circulation is a problem, to prevent contamination of low-pressure gas sands, in redrilling wells where fractures or very thin producing formations could be plugged by mud, and where water is scarce and formations are particularly hard, he said.

In the San Juan basin satisfactory results have been had with pressures from 80 to 450 psi. on air or gas in drilling, but higher pressures are more efficient.

Other results of experience with air and gas as drilling fluids in this area include: Less bit weight is needed for a high penetration rate, the use of flush-joint pipe avoids sand-blasting by the cuttings, fishing is easier than with mud, and sidetracking and directional drilling can be done satisfactorily.

The most aggravating problem is water in the hole, which often cakes the cuttings and causes the bit to stick on withdrawal, but this is being attacked by squeezing off the water, running liners, and experiments with chemicals to prevent caking of cuttings and to stabilize the well wall.

No Union Merger Soon

Oil company officials believe formation of giant union not likely this year; see disadvantages of mass tieup

Bertram F. Linz

WASHINGTON.—Oil company officials generally do not believe the "one big union" proposed at Philadelphia last month will become a reality this year.

But some appear to feel that if the idea gets any encouragement at all from the independent unions, the effort to consolidate them may be continued or at least renewed at a more opportune time.

Many officials visualize plenty of drawbacks for the companies but few advantages if the proposed oil and chemical workers union becomes an actuality.

A big point with some is the belief it would tend to break down the intimate relations they have worked hard to develop between management and labor. They feel it would interpose a third party between them in the shape of union officials who are not conversant with conditions at individual refineries.

Some make the very big point that an all-industry union calling an all-industry strike could raise a barrier between the industry and the public.

And carrying that idea out to the logical ultimate conclusion, a strike tying up the entire industry and leaving the public without oil supplies could well set in motion a drive to put the industry in a public utility status.

Plans not fully developed . . . While some officials thus speculated on what might occur under a given set of conditions, they were quick to point out that the matter has only recently come up and has not developed to the point where factual statements can be made.

Some significance is attached to the fact that a number of rather important independent unions were not represented at the Philadelphia meeting.

Some of these unions, it was said, enjoy better wage and working conditions than do the C.I.O. unions which apparently would become the backbone of the O.C.W.U. and are seen unlikely to go along with the idea.

Just how the individual unions view the project probably will not be definitely known until the ratification convention next August.

The company view of an all-industry union appears to be conditioned by the experience of the coal industry with John L. Lewis, who has never contributed to good relations between management and labor or between the coal industry and the public.

Political effect seen . . . There is also some political importance in an all-industry union as contemplated for the oil and chemical industries.

Labor officials have never been able to "deliver" the vote of their members. However, union representatives speaking before the Government and Congress for 500,000 oil workers and a similar number of chemical workers would be listened to carefully. This might have significant influence on legislation dealing with industry questions, such as the depletion allowance.

No matter how far afield they go in speculation, however, many company executives come back to the point that labor problems of their companies can best be handled on an intimate basis. They believe bargaining can be handled best at the individual plant, where local management talks with local union representatives.

In some plants the workers have registered their support of this system in National Labor Relations Board elections. The independence of the local union thus to bargain for itself may be an important factor next August.

Industry Briefs

WINNIPEG, Man. — The Oil and Gas Conservation Board raised the daily allowable for Daly oil field from 75 to 120 bbl. and for Roselea field from 70 to 100 bbl. The board also set an allowable production of 1,250 bbl. for the first 5 days of production for any well located outside the boundaries of existing fields.

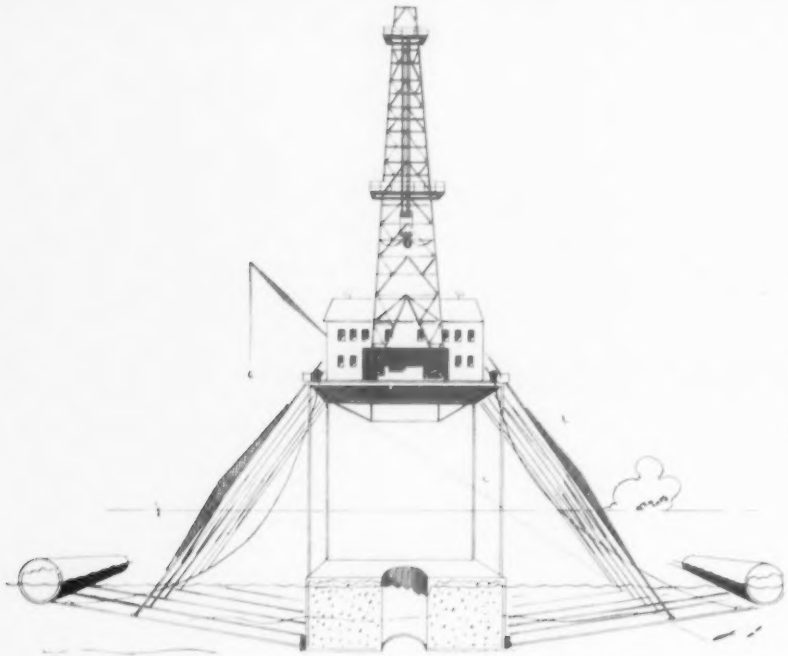
SANTA FE.—Leases on 53 tracts of state-owned land will be offered for sale here March 16, the New Mexico Public Lands Office announced last week. E. S. Walker, commissioner of public lands, said sealed bids will be taken on 31 of the parcels, with the remaining 22 tracts to be sold on oral bidding. Lists of the tracts are available at the Public Lands Office in Santa Fe.

BISMARCK, N. D. — A flurry of bidding marked an oil and gas lease sale in which the Bank of North Dakota received $80,410 for 8,582 acres of bank-owned land. In a second sale the bank acted as agent for the North Dakota Rural Rehabilitation Corp. for the sale of 3,925 acres which went for $46,573. The top bid was $180 per acre for 60 acres in Williams County, paid by T. N. Jordan of Bismarck, reportedly buying for Amerada Petroleum Corp.

OKLAHOMA CITY.—Ohio Oil Co. paid high prices of $6,496 each for two 80-acre tracts in Pottawatomie County in lease bidding here at which the Oklahoma School Land Commission received $88,000 in bonuses on 77 leases. Leases were sold in Beaver, Cimarron, Garvin, Lincoln, Nowata, Pawnee, Payne, Pottawatomie, Stephens, Texas, and Wagoner counties.

BRADFORD, Pa.—Up to $30,000 will be made available to the Petroleum Refining Laboratory of Pennsylvania State University this year by the Pennsylvania Grade Crude Oil Association for research studies on ways to turn heavy oils such as cylinder stocks into more readily marketable products.

OKLAHOMA CITY.—The Oklahoma State Board of Affairs will receive bids here March 16 on the Interstate Oil Compact Commission's new eight-room, stone and brick office building. The Oklahoma Legislature authorized construction of the $70,000 building with money from the state conservation fund.



Newest drilling barge has . . .

"Wings" For Stability

HOUSTON.—The "Sea Bat," a revolutionary new drilling barge has been patented by Alonzo L. Smith, president of Petroleum Instrument Co., here.

While the barge is not a reality, scale models have demonstrated the design's workability.

The unit will consist of a huge lower pontoon section fitted with large flaps or wings—giving it the name "Sea Bat"—to provide stability during towing, lowering and raising operations. This section is connected to the main deck by adjustable side-boom arms *(see illustration)* and structural members.

The wings, or flaps, are fitted with big air-ballast tanks which can be flooded gradually to keep the entire unit on an even keel at all times during raising or lowering operations.

The most unusual features of the unit's design are the adjustable side-boom arms connecting the lower section with the upper deck. The inventor points out that this arrangement greatly increases the depth limit in which the barge can operate. As water depths of drilling locations increase, the side-booms and structural members connecting the upper deck and the lower pontoon sections could be fabricated to the desired footage for almost any depth. This would provide the necessary height to keep the main deck, containing the drilling rig, equipment and housing for the crew, out of the water.

Low center of gravity . . . The design is such that the center of gravity will be sufficiently low that no matter what size barge is constructed, it will not capsize due to the load and height of the drilling mast. In other words, a barge drilling in 50 ft. of water would naturally be smaller in over-all proportions than a barge designed to drill in much greater depths. The dimensions would always be kept in relation to each other, no matter what the size, and the principle on which the barge is raised and lowered would be the same in all cases.

The inventor claims that once the unit is firmly sunk on the bottom of the sea (the design of the flaps makes the load-bearing surface much larger than that of the main bottom section itself) nothing can move it. The water pressure, plus natural accumulation of silt, would make the barge immovable.

Changing location . . . Once a well has been drilled and the barge is to be moved, built-in jets would force off the silt. At the same time, the lower pontoon section and ballast tanks on the ends of the flaps would be pumped free of water, and the entire unit would rise slowly. The barge would then be towed to the new location by tugs, without being entirely raised.

(An article on details of the design will appear in an early issue of The Oil and Gas Journal's engineering section).

Offshore Symposium

Problems of over-water drilling and production, latest designs for new equipment described at A.P.I. meeting

William P. Sterne

HOUSTON. — The fascinating and costly business of offshore drilling and production was discussed in detail at the spring meeting here last week of the southwestern district of the Division of Production of the American Petroleum Institute.

Fantastic new equipment being built or planned, new drilling techniques, and new ideas in safety, equipment design, and handling of production, were described in one of the most comprehensive symposia devoted solely to offshore problems ever held.

Virtually all types of offshore equipment were discussed, including permanent platforms, the submersible drilling barge, and combination platform-barge units which sink their own foundations.

These mobile units are no cure-alls, but they possess interesting cost-cutting possibilities, John M. Payne, of Shell Oil Co., Houston, declared.

Unknown factors in developing this type of equipment offer a real challenge, but there is little doubt that oil men will meet it squarely and solve the problems, he said.

New "mobile-type" units discussed included:

. . . Kerr-McGee Oil Industries, Inc., submersible barge for drilling in water as deep as 22 ft.

In this unit, a 160 by 54-ft. hull is lowered to the bottom of the water by flooding, while pontoons remain buoyant for stability. Pontoons are then sunk by flooding them, and bearing pressure on the soil is controlled by ballasting the lower hull compartments and adjusting the force on the pontoons, as necessary.

... **Ocean Drilling & Exploration Co.'s** new diesel-electric submersible barge, which literally sinks its own engine room to the ocean floor *(The Oil and Gas Journal, February 8, page 96).*

Designed to operate in up to 40 ft. of water, this barge's stability is maintained during lowering or raising by buoyancy of the columns and small outrigger pontoons.

... **Southern Production Co.'s** diesel-electric barge for use in up to 40 ft. of water.

Measuring 200 by 74 ft., the lower hull of this unit is sunk to the ocean floor while the stern end remains afloat and the pontoons on the bow end are kept afloat to maintain stability. Then the stern is sunk and the pontoons, which are controlled by 150-ton rams, are sunk. Bearing pressure on the soil is controlled by ballasting the lower hull compartments and adjusting force on the pontoons.

... **Bethlehem** "mobile platform" for use in up to 100 ft. of water.

Lower hull dimensions of this platform, which is in effect a barge, are 106 by 80 ft. The upper hull has an 80 by 50-ft. platform. Towed to location, the platform piling is dropped to the bottom and forced into the subsoil by means of hydraulic jacks. Weight of the upper hull is applied to two diagonally opposite piles at a time until desired penetration is obtained. Then the upper hull is clamped to the piles and the lower hull submerged by flooding and placing downward pressure on it with the access tubes. Men then go down these tubes and clamp the lower hull to the piles. The two units are raised in a reverse manner with the hydraulic jacks being used to pull the piles.

... **Friede & Goldman's** mobile offshore barge for use in up to 100 ft. of water.

The lower hull of this 200 by 140-ft. barge is flooded until it is barely buoyant, then forced to the ocean floor by taking up on the cables with power winches. After stability of the support hull has been established, the upper hull is then raised to the required elevation by continuing to take up cable with the winches. Upper hull is then fastened securely to the elliptical columns (8 by 10 ft.). During the hurricane season, piles can be driven through the columns for additional lateral support.

... **Le Tourneau's** elevated barge, for use in up to 100 ft. of water.

This barge, having a hull dimension 140 by 80 ft. and leg dimensions of 20 by 20 ft., is towed to location and its legs lowered by operating rack and pinion drives in the corner of each leg. When the legs penetrate the soil deep enough to start carrying the load, the barge is lifted out of the water to desired height.

... **Offshore Drilling, Inc.'s,** new elevated barge which can drill in up to 60 ft. of water.

The lower hull, 190 by 120 ft., is flooded until it is barely buoyant; the electric motors operating rack and pinion drives on each of the four legs force the lower hull to bottom. Upper hull is then raised to the drilling position with the same electric-motor system.

Tenders . . . W. D. Stine, of Gulf Oil Corp., Houston, told the group of several new type drilling-tender ships which are under construction or planned for the future. Stine said that the oil operators themselves were the first to admit that converting LST's and other war-surplus equipment is not entirely satisfactory, due to limitations such as inability to hold sufficient pipe and other equipment.

Stine pointed out that it is about as economical for companies entering the Gulf of Mexico play now to order entirely new vessels, drawn to their own specifications, as it would be to obtain a war-surplus ship, price of which is now out of all proportion to what it used to be.

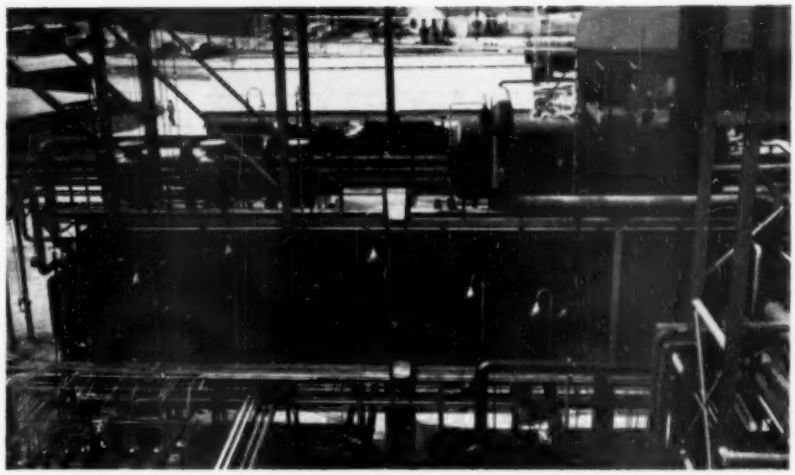
Virtues of an "ideal" tender vessel, Stine said, are these:

1. It must be big enough to "ride out" a tropical storm at anchor if necessary.

2. It must be designed or converted for the most efficient operation while anchored at a drilling platform rather than when under way.

3. It should be big enough to hold extra drilling equipment, pipe and casing racks, mud and cement storage, and other supplies necessary to drill and complete at well.

4. It should provide comfortable



Largest "Cascade" Reactor in New Unit

HOUSTON.—Eastern States Petroleum Co., Inc., has put a 3,000-bbl. alkylation unit on stream at its 50,000-bbl. refinery here. Total construction time was only 4½ months.

Brown & Root, Inc., designed and built the unit, working in conjunction with Eastern States' maintenance personnel.

The new unit uses the Kellogg process and is part of a $5,000,000 expansion program which has been going on the past 3 years at Eastern States' plant. The refinery is one of the largest independent plants on the Gulf Coast.

Included in the expansion program have been a new Platforming unit, a benzene-recovery unit, and a solvent-refining unit. The new alkylation unit utilizes the largest "cascade type" reactor ever put into service. Light-hydrocarbon feed for the unit is obtained from the gas-concentration section of the catalytic cracking unit, which fractionates gas streams from the thermal unit at Plant 1 and the Platformer and catalytic cracking unit at Plant 2. About 1,200 bbl. per day of isobutane has been purchased to be used with the olefin feed from the company's sources to form the combined charge to the new unit.

quarters for the crew and adequate recreational facilities.

5. It should meet all requirements of the U. S. Coast Guard and American Bureau of Shipping, as well as U. S. Public Health Service and other regulatory bodies.

Auxiliary equipment . . . Cost of offshore transportation of men and equipment is high whether a company operates its own facilities or charters them, J. C. Craig, Continental Oil Co., Houston, said.

Which it should do is an individual company question, he said. A 30 to 45-ft. boat under charter costs $60 to $80 a day, and a 65-ft. crew boat may charter from $150 a day up.

Studies of operating costs of company-owned marine equipment show that a 65-ft. crew boat costs about $125 a day, an 80-ft. boat $175 a day, and a 100-ft., 500-hp. tug $300 a day, not including depreciation or insurance.

Time savings are possible by use of amphibian planes and boats, Craig said. Plane rentals are about $180 an hour if rented for a 40-hour month or $84 an hour for a minimum 60-hour month.

Safety . . . The importance of offshore fire and safety protection was emphasized by John N. Donhaiser, Pure Oil Co., Houston.

He said that although a good deal has been done to cope with offshore hazards, the petroleum industry faces a situation where safety precautions will, and must, play a much greater role than ever before in the history of the oil industry.

Beaumont Properties Sold

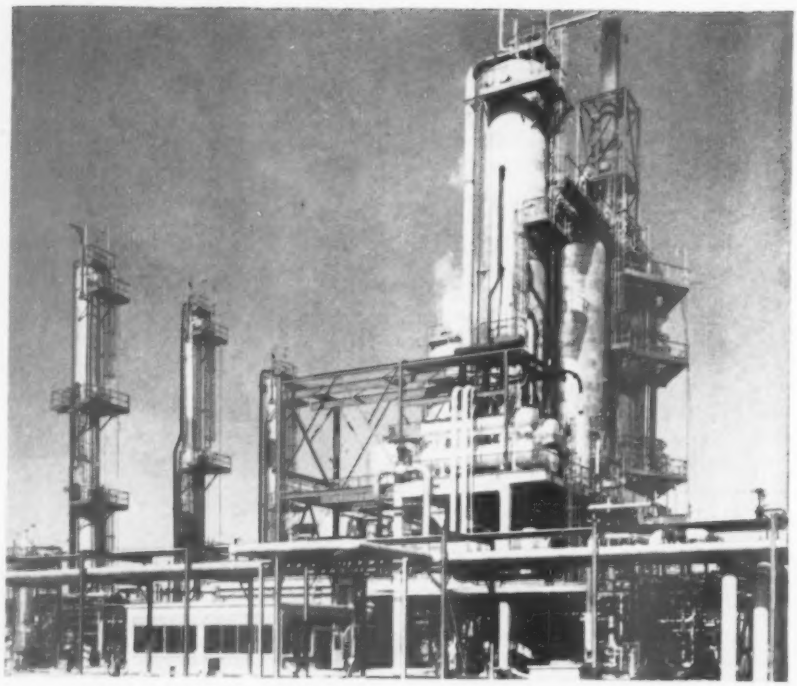
BEAUMONT, Tex.—H. H. Myers, Dallas independent oil producer, has purchased 41 producing oil and gas wells in West Beaumont field for $2,250,000 in cash, plus additional payment in oil to be produced from the field.

Myers said that the total amount involved will eventually be more than $4,000,000. He is the principal purchaser.

H. R. Smith of Alice, Tex., independent oil producer, was chief owner of the properties. His associates were L. L. Williams and John Orgain of Beaumont; Fred Greenburg of Corpus Christi; and Doug Weatherston and Bill Winn, San Antonio.

Associated with Myers in the purchase were M. J. Mitchell, Mount Vernon, Ill.; and Dave Ross, Fort Worth.

The deal includes 810 acres of leases, and Myers said some additional drilling will be done on the property.



Model IV Cracker Proves Itself

F. Lawrence Resen

NEW ORLEANS. — The Model IV cat cracker, a simpler and cheaper version of the earlier fluid units, has proved itself in operation.

Operating data on the unit in Pan-Am Southern Corp.'s Destrehan, La., refinery were released for the first time last week. The company announced that during 3 weeks in August and September the unit operated at an average conversion of 56.3 per cent of a fresh-feed charge of 14,300 bbl. of 29.9°-gravity virgin gas oil per stream day.

The unit, designed by the Lummus Co. under license of the Standard Oil Development Co., was one of the first to go into operation of 21 such units scheduled for construction in this country and abroad. Design of the unit permits a lower profile, requires 30 per cent less steel, reduces initial and maintenance costs, permits more stable operation and easier process control.

Most notable feature of the unit is the catalyst transfer system, which employs two U-bends to transfer regenerated and spent catalyst between the reactor and regenerator, thereby eliminating the conventional long standpipes and dual slide-valve arrangement.

The accompanying table presents operating data released by the company covering 3 weeks of operation.

OPERATING CONDITIONS AND YIELDS

Operating conditions:	Three selected weeks			Average
Reactor temperature, °F.	922	922	915	920
Reactor pressure, psig.	9.1	9.0	9.15	9.1
Catalyst circ., T/M	21.5	22.1	23.0	22.2
W.H.S.V.	1.15	1.21	1.22	1.19
Slurry recycle, bbl. per stream day	721	679	915	772
C-O ratio	13.03	13.45	14.38	13.5
Regen. temperature, °F.	1,107	1,105	1,080	1,097
Regen. pressure, psig.	11.7	10.8	10.6	11.0
Regen. velocity, F.P.S.	2.26	2.38	2.40	2.35
Fresh feed, bbl. per stream day	14,500	14,500	14,093	14,368
°A.P.I.	28.7	29.1	30.8	29.9
Conversion (corrected per cent)	54.4	57.2	57.3	56.3
Yields:				
Light naphtha, bbl. per stream day	5,168	3,980	5,478	4,875
PP-BB, bbl. per stream day	2,310	2,465	2,515	2,430
Light gas oil, bbl. per stream day	4,720	4,734	4,192	4,549
Heavy gas oil, bbl. per stream day	1,549	1,521	1,288	1,453
Flush oil, bbl. per stream day	418	420	450	429
Average base stock, bbl. per stream day		708		

Coning vs. Fingering

If water or free gas is produced prematurely, it's more likely to be due to fingering, A.P.I. production men told

F. Lawrence Resen

HOUSTON.—Premature production of water or free gas from most formations on the Gulf Coast is more apt to be caused by fingering than by coning. This is the conclusion of the Houston study group of the committee on thin oil columns of the A.P.I. Southwestern District.

In a report made to the district meeting here, T. O. Allen of Humble Oil & Refining Co. defined fingering as the premature movement of water or free gas toward a well, from below or above a fluid contact, by flow along the formation bedding planes.

This will occur in stratified sands, such as those on the Gulf Coast, where the ratio of vertical to horizontal sand permeability is low and barriers to vertical fluid movement, such as shale lenses and hard streaks, are present.

Fingering may also occur in a single sand member with no vertical barriers to fluid movement in the sand section if excessive pressure drawdown results from the imposed producing rate. Many oil-producing formations in the area are stratified and there are wide differences in the thickness of the respective high and low permeability strata in one formation as compared with another.

When the completion interval in a well contains one or more of these permeable strata, the members with the higher permeability will usually contribute a larger fraction of the total fluid produced by the well at a given pressure drawdown corresponding to an imposed producing rate.

Fingering is aggravated when several permeable strata opened in a single completion interval have extreme variations in permeability. Difficulties with fingering may be minimized by limiting the completion to a single permeable member so production from each zone can be controlled.

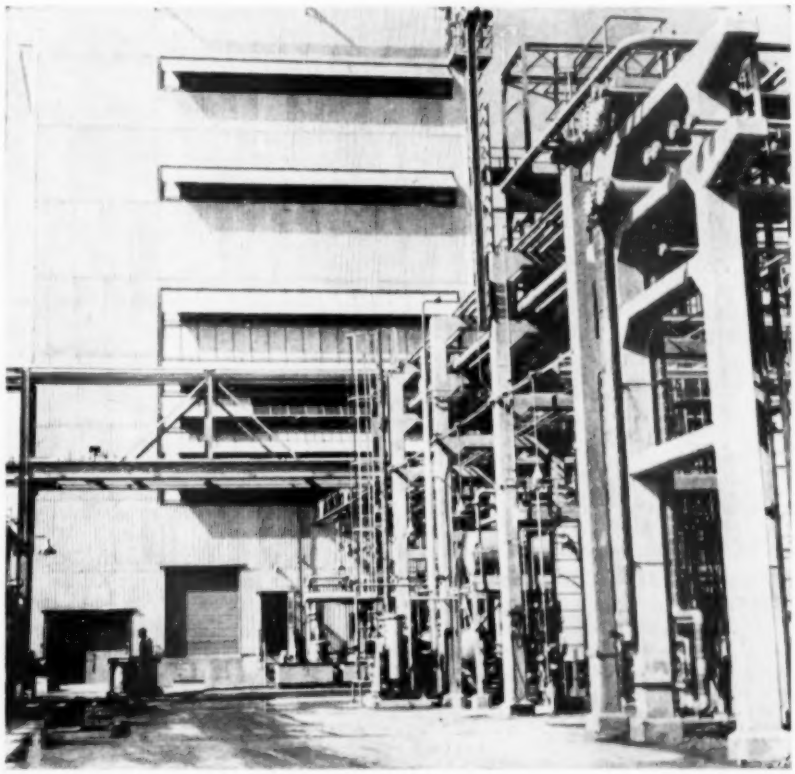
However, extremely short completion intervals may result in an excessive number of costly recompletions in order to deplete the sand penetrated by each well. Lower workover costs achieved by using through-tubing tools or the "permanent well completion system" may permit economical depletion of stratified zones in several short increments.

Coning explained . . . Coning was defined as the vertical movement of a fluid toward a completion interval from below or above a fluid contact by flow across the formation bedding planes.

Coning may occur where appreciable continuous vertical permeability exists from the completion interval to the fluid contact and where barriers to vertical fluid movement are not present. Coning results from the unbalancing of gravitational forces by the pressure gradient applied to drive oil into the well bore and often causes a premature production of salt water or free gas.

When elimination of water or gas is not feasible, it was the conclusion of the study group that production of water is preferable to that of gas and that completions should usually be located closer to the water-oil contact than to the gas-oil contact in thin columns.

To minimize fingering and coning, the study group recommended careful control over withdrawal rates from the beginning of production, new techniques in production practices to allow more zone selectivity, and good primary squeeze jobs instead of precautionary squeeze jobs.



Plant Boosts Epon Resin Output

HOUSTON. — The world's largest Epon resin plant went on stream here last week tripling Shell Chemical Corp.'s capacity to produce materials in great demand in surface-coating and structural fields.

As a part of the same expansion, Shell Chemical is opening a bis-phenol-A plant to make the resin plant independent of outside suppliers of this component of Epon resins. The manufacture of epichlorohydrin, the other chief component of these resins, was pioneered by the company.

Paints formulated on Epon resins are being used in applications where unusual resistance to alkalies and detergents is required, as in the finishes for washing machines. In the structural field, Epon resins have had their readiest acceptance in the casting and potting of electronic components and in the manufacture of printed electrical circuits. The adhesive qualities of the resins have given them wide use in industrial applications requiring the joining of metals, glass, and other materials.

Seaway Future Assured

St. Lawrence project, debated for half century, will be built entirely by Canada if U. S. does not take part now

WASHINGTON.—The St. Lawrence seaway, agitated for 50 years, approved by the Senate a few weeks ago and soon to come up in the House of Representatives, will change the economic face of the United States.

It is pretty certain the seaway will be built. If the whole project is not undertaken by joint U. S.-Canadian action, a large part of it will be built by Canada in Canadian territory and in the long run it could cost the United States a great deal more to complete it to save trade and industry that otherwise would go across the border.

For the oil industry, the seaway will mean better access to Canada's oil, power and materials for refinery and petrochemical operations, lower freight rates between Lake and Atlantic ports, and lower transportation costs for trans-Atlantic shipments from the Midwest.

Full construction of the seaway is seen as costing several billion dollars. The legislation now pending in Congress provides a fund of $105,000,000 to start it off. The project includes the digging of a ship canal in and along the St. Lawrence from the Atlantic 2,650 miles to the Great Lakes, and the building of a hydroelectric station from which the U. S. and Canada will divide 12 billion kilowatts of electric power annually.

To carry out this construction it will be necessary to move a number of small communities from sites which will be flooded and to relocate the main line of the Canadian Pacific Railroad.

Currently it is reported there is a great deal of speculative buying of land along both sides of the St. Lawrence, but there are also definite plans being made for the construction of industrial facilities, among them a E. I. du Pont de Nemours & Co., Inc. plant for neoprene synthetic rubber and Union Carbide and Chemical and Hooker Electrochemical plants to supply materials for Du Pont. The seaway also will be important for the shipment of iron ore from new deposits in Quebec and Labrador to inland steel mills and plants, and may have an important influence on the traffic in oil to and from the Midwest.

Opposition . . . The St. Lawrence seaway always has been vigorously opposed by the coastal ports, steamship companies and major railroads. They contend it would wipe out the business of a number of major cities and industries. Only the threat of Canada to go ahead on its own, plus the announcement by New York Governor Thomas E. Dewey that if the federal Government did not act the state would undertake construction of at least part of the project, softened that opposition to the point where the legislation could get Senate approval.

The affirmative side of the argument is that if the U. S. doesn't join in the project Canada will do it alone. The affirmative contention is that the seaway will not ruin ports from Boston to New Orleans, will not put railroads or industries out of business because the expanding economy of the country will require the use of all its transportation and productive facilities. And if the seaway isn't built, it is contended, it is only a matter of time before the inland steel mills, already facing depletion of domestic ore sources, move to New York or New England to be closer to Canadian sources or to the south to be nearer supplies of ore from Venezuela.

Years involved . . . Although the only really tough part of the project will be the 46 miles along the International Rapids, it will take a number of years to dig the seaway and put in the hydroelectric and other facilities.

While it is building, business will be good for a number of industries, for the initial phase alone it is estimated some 180,000 tons of steel, 4,400 tons of copper, 7,500,000 bags of cement and 118 billion feet of lumber will be required, together with an unestimable but tremendous amount of gasoline, fuel oil, lubricating oil and other petroleum products.

U. S. Contracts for Tankers

WASHINGTON. — Fourteen clean tankers were chartered by the Military Sea Transportation Service for voyages in March.

Three of the tankers were contracted by exercising options held by the Government on previous charters for consecutive voyages. The remaining 11 were for single voyages.

Rates for the tankers ranged from 20 to 21 per cent below the basic Maritime Commission rate applicable in the area of the voyage. Charters entered into for February voyages were at the same rate.

OGD Broadens Field

Revived agency will tackle more work with small staff

WASHINGTON. — The revived Oil and Gas Division will require a smaller staff but cover a much broader field of work than it did before the Korean war.

Testifying before the House appropriations committee, Acting Director Hugh A. Stewart explained the program laid down for OGD will require a staff of 36 persons, most of them expert in various branches of the industry, with a payroll of $264,975 a year. For the fiscal year 1949, the old OGD asked for a staff of 45 with a payroll of $250,610, but Congress cut that to 23 persons and $106,559.

Explaining the plan to liquidate Petroleum Administration for Defense in the near future, Deputy Administrator Joseph A. LaFortune pointed out that while its former functions will be returned to OGD there are also responsibilities under the Defense Production Act delegated to the Secretary of the Interior that will have to be continued.

Among these responsibilities, LaFortune said, will be continued review of oil and gas defense mobilization goals to assure a sufficient reserve capacity to meet the ever-changing mobilization requirements. That review, he pointed out, must cover the world-wide situation as well as domestic conditions to give the military a constant flow of accurate, sound and up-to-date advice and information on which to base its strategic planning.

Similarly, LaFortune explained, the Office of Defense Mobilization must have information to assure that the broad security plans of the National Security Council have a sound foundation.

OGD also will have the responsibility for information and data for the United States representatives on the petroleum planning committee of the North Atlantic Treaty Organization.

All these activities, LaFortune and Stewart explained, will be in addition to the normal work of the agency, which will include passing on applications for accelerated tax amortization of new facilities, provided for under

the revenue act rather than the Defense Production Act. New applications are now being rated at the rate of 16 to 20 a month, Stewart said, and the work will continue for some time to come.

The set-up of OGD will make provision for its continued liaison with the industry through the National Petroleum Council, Military Petroleum Advisory Board, the Gas Industry Advisory Council and the Foreign Petroleum Supply Committee.

New Survey Offices

Shelf development to take Geological Survey to gulf

WASHINGTON. — The Geological Survey will establish offices at New Orleans and Houston within the next 12 months to handle the expected increased exploration and development of oil and gas on the outer Continental Shelf.

The Interior Department already has about 350 oil and gas leases on the shelf, on which 136 wells have been drilled and 9 are drilling. Drilling so far has resulted in 30 productive oil wells and 34 productive gas wells off the coast of Louisiana.

The two new offices will be used for on-site inspections of the actual development operations, as well as a multitude of administrative actions and determinations. The work will be comparable to that performed on federal and Indian onshore leases, but with the added features of a new legal authorization, newly prescribed operating regulations, and a measure of cooperative effort with the coastal states.

So far as possible the survey will work in cooperation with the state authorities and has already worked out agreements with Texas and Louisiana under which the states will supervise and issue the geophysical and geological exploratory permits. It is also planned to cooperate with the states on proration instead of having a large organization to handle proration problems in the outer area.

Revenues from the outer Continental Shelf already have reached substantial proportions—being estimated at $4,500,000 a year in rentals and $1,250,000 in royalties. They are expected to increase rapidly now that the way has been cleared for development of the area.

While much of the department's work will necessitate visits to the offshore operations, department officials said they do not want to set up a "navy" but hope to secure transportation from the companies, chartering boats or planes when necessary.

WATCHING WASHINGTON

Bertram F. Linz

FTC Limits "Fishing"

The Federal Trade Commission has clamped down on fishing expeditions whereby companies charged with price discrimination once learned with FTC assistance to whom their competitors are selling and at what prices.

This was made clear in a recent decision overruling an examiner who had issued what amounted to a blanket subpoena to a company seeking to find justification for its own price discrimination in the sales of its competitors.

The competitors appealed to the commission, which held that while the company was entitled to subpoenas only for documents and records relevant to its defense that its lower prices were made in good faith to meet a lawful equally low price of a competitor.

More specifically, the commission said, "any subpoenas directing a competitor of the respondent to produce documents and records should be limited to documents and records pertaining to sales and offers to sell by such competitors to customers of the respondent who the record shows were sold at the lower prices." And they should be further restricted, according to the opinion, to the time period involved in the commission's prima facie case.

Depletion Allowance Secure

Present indications are that there will be no changes in the depletion allowance for oil and gas in the new general tax revision bill now being prepared by the House ways and means committee.

The committee has agreed to continue the present rate of 27½ per cent. Unless it changes its mind in its final draft of the bill that rate will go to the floor of the House. There, some opposition may be expressed by members from consuming states, largely for political purposes, but it is not believed any change can be forced.

In its consideration of depletion generally the committee was, if anything, rather generous. Its revision in some respects is more liberal than the present law in the rates of depletion allowed other extractive industries.

Before the bill gets out of committee, however, there is a chance the administration may disclose its views on depletion. President Eisenhower said in his budget message in January, no decision had been reached on the question.

The President said the "special problems" of the oil industry are still under study by the Treasury Department, along with other questions on which recommendations would be made later.

Although it has been reported that Treasury Secretary George M. Humphrey is opposed to the depletion allowance as it now stands, he has not yet publicly made any recommendations for changes.

War Controls Readied

Military expansion has slowed down, but mobilization officials are going ahead with the development of plans for immediate control of the nation's economy in the event of a new emergency.

Another war would bring the same controls on the oil industry and consumers as did the last war, but with one difference. Procedures would be streamlined to minimize paper work incident to day-by-day operations.

Anything less than a full emergency would be handled as was the Korean situation, again with a difference. Instead of the Controlled Materials Plan which regulated the use of every important raw material, the Defense Materials System introduced last year would channel necessary materials to defense plants leaving the rest of the industrial economy free.

Two, possibly three, separate and increasingly severe types of controls are being developed by the Office of Defense Mobilization, for partial mobilization, all-out war and atomic attack.

As they are completed, these plans are being written in the form of legislation. But the appropriate measure will be sent to Congress by the President only in an emergency.

The purpose of this planning is to have ready legislation that can be enacted by Congress in 24 hours, to avoid the delays and mistakes in setting up and applying controls, and the blueprinting of a roller-bearing streamlined machinery for doing the job.

Defense Line Talks

PAD, consultants study convertible pipe line

WASHINGTON. — Petroleum Administration for Defense officials are meeting this week with the panel of consultants appointed by Deputy Administrator Joseph A. LaFortune to study the possibilities of construction by the natural-gas industry of a defense pipe line which could be converted to crude oil in war.

On the basis of the findings of the consultants, PAD is expected to decide whether the National Petroleum Council should be asked at its meeting March 23 to make a complete study of possible methods of providing an additional million barrels a day of overland oil transportation for use in an emergency.

It is generally accepted that neither the oil nor gas industry considers construction of the proposed pipe line economic under present conditions.

There has been no disclosure of the consultants' views. It is expected, however, they will submit figures on the potential pipe-line capacity on the basis of presently existing and planned lines and the extent to which it can be increased by the installation of additional pumping equipment, interconnections and the building of short lines.

Hugh A. Stewart, acting director of the Oil and Gas Division, recently told the appropriations committee of the House of Representatives there is no present idea of having the Government build this or any other line. If that position should be changed Congress would be advised, he said.

A large pipe line from any point of potential supply to the East Coast would cost $200,000,000 or more, Stewart pointed out.

Following this week's meeting, PAD is expected to write a report summarizing the results so far of its efforts to develop a transportation program and pointing out the alternatives that remain after writing off industry construction of a pipe line.

Line Volume, Revenue Down

WASHINGTON. — A slight decline both in volume of traffic and in transportation revenues of common-carrier oil pipe lines in the fourth quarter of 1953 as compared with 1952 was reported last week by the Interstate Commerce Commission.

A tabulation of returns filed by 57 pipe line companies having annual operating revenues in excess of $500,000 showed that during the last 3 months of 1953 they handled 880,379,317 bbl. of oil and products compared with 883,460,298 bbl. in the last quarter of 1952, and had operating revenues of $137,732,776 compared with $140,012,235.

Only 19 companies showed heavier traffic than in the 1952 period and only 20 showed higher transportation revenue, the commission figures disclosed.

Gas Bill Approved

Eminent domain right for gas storage wins support

WASHINGTON. — Legislative proposals to give the natural-gas industry the right of eminent domain for the acquisition of underground storage rights received approval last week by representatives of government agencies and the gas industry in hearings before a Senate commerce subcommittee headed by Sen. William A. Purtell of Connecticut.

The subcommittee is considering a bill introduced last year by Senators Everett Dirksen and Paul H. Douglas of Illinois to extend to the gas industry the same right to condemn land for underground storage as it now has for pipe-line rights-of-way.

The Federal Power Commission approved the bill as a practical way of meeting variations in demand and eliminating the necessity of selling gas for boiler fuel and other inferior uses in periods of slack demand. The measure also was supported by the Department of Defense and the Petroleum Administration for Defense as a measure of security.

Amendments submitted . . . Several government agencies, the Independent Petroleum Association of America, and spokesmen for the gas industry have submitted amendments designed to make the measure more specific and protect rights of landowners, oil and gas operators, and others.

The FPC chairman, Jerome K. Kuykendall, told the subcommittee that it can be argued that the Federal Power Act already covers rights of eminent domain for acquisition of underground rights, but the FPC believes the point should be clarified.

It was explained that while some states have laws aimed at what the congressional measure would do, they confine to intrastate operations whereas the gas which would be put into underground storage is in interstate movement.

Testimony developed the FPC's belief that expansion of underground storage might make available as much additional gas as the construction of another pipe line. J. J. Hedrick, president of Natural Gas Pipeline Co. of America, in a letter to Purtell, also stressed that point.

The subcommittee will hold further hearings, at which representatives of the coal industry may oppose storage in mining areas because of the possibility of gas seepage into coal mines.

Depletion Battle Possible

WASHINGTON.—A bitter fight over the depletion allowance on oil and gas production was foreshadowed in the Senate last week, when Sens. John J. Williams of Delaware and George D. Aiken of Vermont, both Republicans, submitted a proposal to cut the allowance from 27½ to 15 per cent.

The two senators also submitted an amendment to eliminate the present noncompetitive leases issued by the Interior Department and make it mandatory for the department to lease all public lands by competitive bidding only.

The House ways and means committee, now writing the new tax bill, agreed last month to let the depletion allowance stand as presently provided. If it does not change its mind and the bill is brought up on the floor under a rule barring the introduction of amendments, that rate will stand in the measure when it goes to the Senate.

If they make a real effort to put over their amendments, Williams and Aiken conceivably could muster substantial support among members from the consuming states, particularly if they presented it as a method of securing revenue to offset the loss involved in a plan offered by Senator Walter F. George of Georgia to increase individual exemptions.

Refining Dividends Up

WASHINGTON.—Publicly announced cash dividend payments by oil refining corporations amounted to $5,000,000 in January compared with $3,000,000 in the same month in 1935.

For the 3 months ended with January, dividend payments totaled $312,900,000 compared with $282,400,000 a year ago, the Commerce Department reported last week.

January traditionally is a light dividend month but payments by industry generally increased substantially this year by the deferment until that month of payments formerly made in December.

Frontier in Rockies

Vision and imagination are keys to exploratory success, keynote speaker tells Rocky Mountain group of A.A.P.G.

Frank J. Gardner

ALBUQUERQUE, N. M.—More than 2,000 geologists attended the fourth annual meeting here of the Rocky Mountain section of the American Association of Petroleum Geologists. The program featured 33 papers on various phases of Rocky Mountain geology, centering around the theme of "Exploration Frontiers" in 10 states.

The general purpose of the meeting was an inventory of what has been accomplished, what is being accomplished, and what remains to be done in reaching maximum geological exploration for oil in the Rocky Mountain region.

In his keynote address, Max L. Krueger of Laramie, Wyo., told the delegates that geological prejudice can be the greatest deterrent to future oil development in the Rocky Mountain region. He called for vision, imagination, and speculation as the key to success in exploration here.

In 3 years, Krueger continued, the geologist has conquered many exploration frontiers—the Julesburg and Williston basins, the Wasatch plateau, and deep reservoirs in older shallow fields with extremely complex subsurface geology. Still unconquered, however, are the Powder River, Wind River, and Green River basins, and the Las Animas and Cambridge arches, among others.

Presidential address . . . Paul H. Umbach of Denver, in his presidential address, emphasized that the sedimentary basins of the Rocky Mountains are in their initial stages of development and called for increased pipe-line construction, exploration, drilling, and development. He reviewed the history of the Rocky Mountain section of the A.A.P.G. and predicted increasing growth and importance for the organization.

Philip C. Ingalls, of Socony-Vacuum Oil Co., Inc., New York, reviewed 1953 developments in oil throughout the United States as an index of what might be expected in the way of future discoveries. He predicted a bright exploration future for the Rocky Mountains, the Great Plains, and the southeastern states.

Economic outlook . . . The economic outlook for the Rocky Mountain region was outlined by R. O. Anderson, president of Malco Refineries, Inc. He pointed to improved transportation facilities and added refining capacity as important factors in the enormously improved future outlook.

DISTINGUISHED DELEGATES to the recent fourth annual meeting of the Rocky Mountain section of the American Association of Petroleum Geologists in Albuquerque were John Emery Adams, left, of Midland, president of the A.A.P.G., and Morgan J. Davis, right, of Houston, immediate past president.

Papers read by 29 additional speakers covered exploration activities in New Mexico, North and South Dakota, Montana, Wyoming, Colorado, Nevada, Arizona, Utah, Idaho, and western Canada. Abstracts of all these papers will be presented in the annual geological issue of The Oil and Gas Journal on April 19, 1954.

It was announced at the meeting that next year's meetings will take place in Billings, Mont.

Fanshawe Heads Geologists

ALBUQUERQUE, N. M. — Members of the Rocky Mountain section of the American Association of Petroleum Geologists elected J. R. Fanshawe, Billings, Mont., consultant, president for the coming year.

J. R. FANSHAWE

F. A. (Gus) Thurman, Denver consultant, is the new vice president, and H. A. Hadley, of Billings, is secretary-treasurer. State representatives elected were Julian W. Lowe, California Co., of Denver, for Colorado; S. H. Collins, Stanolind Oil & Gas Co. of Salt Lake, for Utah; L. E. Harris, General Petroleum Corp. of Basin, and J. E. Partridge, consultant, of Casper, for Wyoming; Allen Cree, Cities Service Oil Co. of Billings, for Montana; Stanley L. Smith, Atlantic Refining Co., and Raymond S. Hunt, Cities Service, both of Roswell, for New Mexico.

Outgoing officers are Paul H. Umbach, president; A. G. Alpha, vice president and Jack C. Cooper, secretary-treasurer.

Refinery Output Contracted

WILLISTON, N. D.—Williston Basin Refining Corp. has signed a contract with Orskey Brothers Petroleum Corp., St. Paul, to market products to be manufactured by a 1,500-bbl. refinery being completed here. The refinery is scheduled to go on stream about April 15.

Orskey Brothers is an independent firm operating 56 service stations in Minnesota and North and South Dakota. The company plans to market within a 100-mile radius of Williston, including Montana and Canada.

Unit Case Appealed

Phillips asks Circuit Court to overrule Utah decision

DENVER. — Thirty-one owners of land in the Roosevelt area of Utah on which Phillips Petroleum Co. holds oil and gas leases have been mailed notices that Phillips is appealing a Utah federal judge's decision that the unit or pooling clause in the leases is invalid.

The U. S. Tenth Circuit Court of Appeals here has been asked to overrule the decision, regarded as a threat to all long-term oil and gas leases.

U. S. District Judge Willis Ritter ruled the unit clause is "too indefinite and uncertain" to be enforceable and added it also violates the legal "rule against perpetuities."

The case first went to court in Utah when several companies attempted to set up a field-wide unitization program for Roosevelt pool in Uintah County, Utah, with Carter Oil Co. as the operator. Holders of 31 Phillips leases included in the proposed 34,000-acre exploratory unit objected.

Phillips went into Judge Ritter's court seeking declaratory judgments on the basis of the unit clause in the leases which gives the company the right to unitize the lease with any other lands. The clause, standard in lease forms used throughout the Rocky Mountain area, the Mid-Continent and Southwest, became the point of contention in a case that could have far reaching effects.

Since the material facts involved were identical in all 31 of the suits filed by Phillips against individual land owners, the cases were consolidated for trial purposes and the decision was based on one suit against Heber A. Peterson.

Because of crowded court dockets, Phillips attorneys anticipate it will be several months before a ruling on the case is forthcoming from the Circuit Court here.

Coker Awaits Good Weather

BILLINGS, Mont.—Spring weather will fire the starting gun for construction on the first commercial fluid coking unit at Carter Oil Co.'s refinery here.

Materials for the new 3,000-bbl. unit have been delivered and Fluor Corp., Ltd., the contractor, will begin work on the new unit as soon as weather permits. The unit is expected to be completed and in operation by October.

The new coking process, designed to increase the output of gasoline, tractor, and diesel fuel is a development of Standard Oil Development Co. The unit at Carter's refinery here is the first of three units planned in the United States.

New Crude Line Planned

CASPER, Wyo.—NNCW Pipe Line Co., a new firm, is planning construction of a 127-mile $3,500,000 crude-oil pipe line from Weston County, Wyoming, to Casper.

The company filed an application with the Wyoming Public Service Commission for construction of 108 miles of 10-in. line, 19 miles of 8-in. line, and an unstated amount of 4-in. gathering lines. Ultimate capacity of the line would be 60,000 bbl.

William J. Garlow, Dallas, and George Guy and Lewis Mankus, Cheyenne, Wyo., attorneys, organizers of the firm, said construction will start within 60 days after the permit is granted.

Spacing Change Asked

PIERRE, S. D.—The South Dakota Oil and Gas Board has taken under advisement requests of oil operators to change the present minimum spacing of 10 acres for oil and gas wells.

Requested was 40-acre spacing for oil drilling, with wells to be approximately in the center of the tract, and 600-acre spacing for gas wells with gas wells to be at least 3,000 ft. apart in a pool.

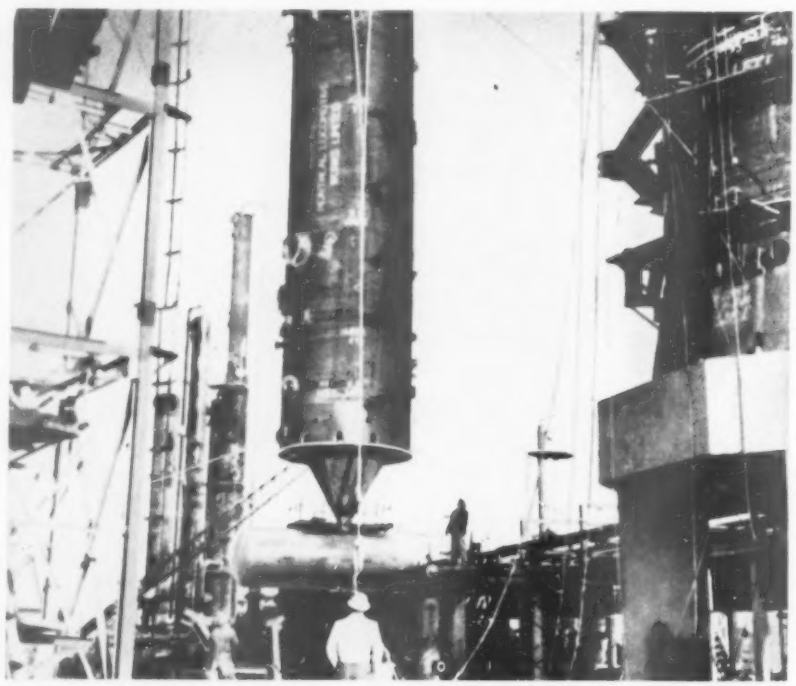
Operators also asked the board to provide that a blanket surety bond of $15,000 cover all drilling operations of an operator instead of the $3,000 bond now required for each well.

A fourth request was that the board grant permission to plug and abandon a well by telephone or telegraph. Operators at present are required to have written permission from the board before abandoning a well.

New Company Organized

DENVER.—Great Basins Petroleum, Inc., has been formed with headquarters here to handle production and exploration in 12 states and Canada. The new company, capitalized at $6 million, is formed of a combination of assets of several operators.

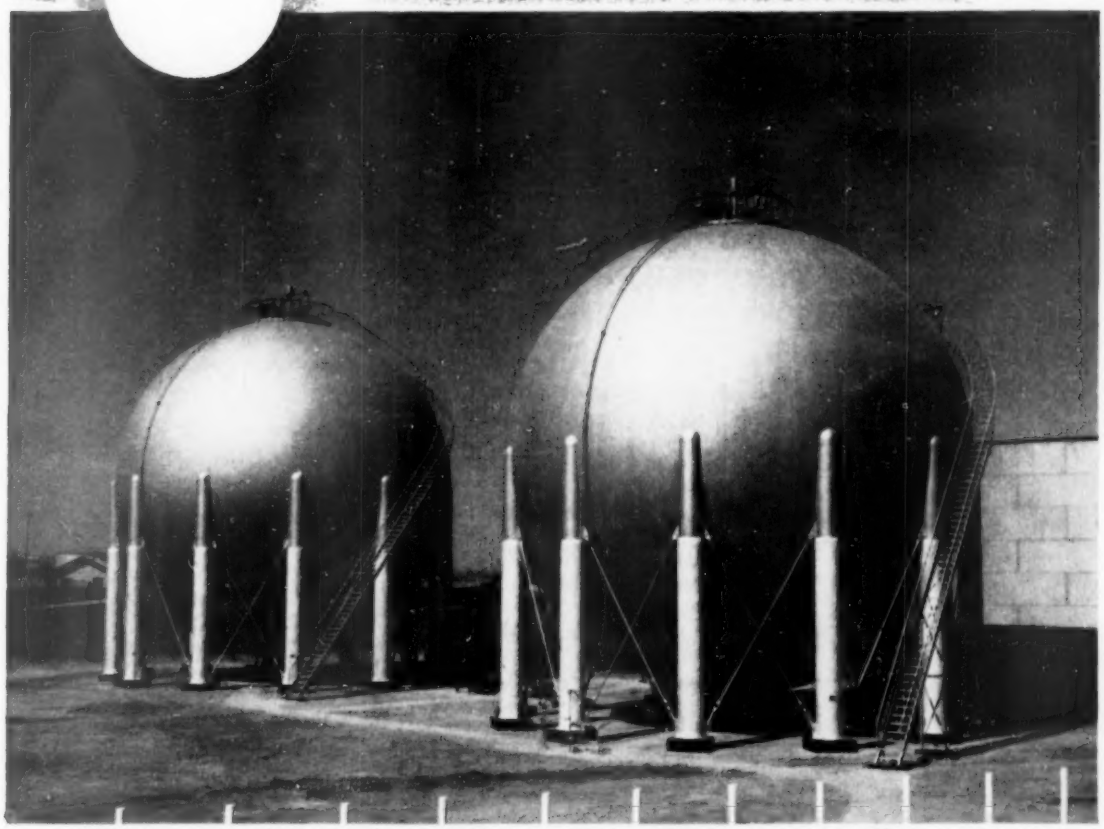
C. G. Glasscock, Jr. of Corpus Christi is president. J. Pierce Gannon, Calgary; F. R. Anderson, Santa Maria, Calif.; H. L. Hurley, C. G. Glasscock, Sr., and J. N. Blair are vice presidents. Robert Bruce is secretary.



Clarkson Refinery Undergoing Expansion

The main fractionating column is lifted into place next to the Orthoflow unit as British American Oil Co., Ltd., pushes a major expansion program at its Clarkson, Ont., refinery. The program includes an 8,000-bbl. Orthoflow cat cracker, a vapor-recovery system, desulfurization equipment, and a polymerization unit.

Making Hay While the Sun Shines



Hortonspheres* used to store Butane in the summer for blending in the winter . . .

During the summer, when there is a surplus, the Richfield Oil Corporation stores butane, to be used for blending during winter months, in the two 15,000-bbl. Hortonspheres shown above. They are 54 ft. 9 in. in diameter and are located at the company's Watson Refinery in Wilmington, California.

The butane stored in the Hortonspheres is produced in refinery cracking operations plus some received from field sources. It is used to raise the vapor pressure of gasoline, to feed a 1,000-bbl. per day isomerization unit and for sales in bulk quantities.

Hortonspheres are ideal for the storage of the more volatile liquids. There is no loss of the product as long as the internal pressure does not exceed the setting of the pressure relief valves.

Field Welding Supervisory Service

A welding expert is available, through the Chicago Bridge & Iron Field Welding Supervisory Service, to aid the Foreman in charge of a job in checking welding equipment and welding techniques in use. This service is provided on all Horton welded steel plate structures at no extra cost to the purchaser.

Hortonspheres are built in capacities up to 30,000-bbls. and for pressures up to 217 lbs. per sq. in. in the smaller capacities. Further information, estimates or quotations on Hortonspheres, or any other Horton welded steel structure, may be had by writing our nearest office.

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Birmingham, 1	1536 North 50th St.	Houston, 2	2119 C & I Bldg.	Salt Lake City, 4	525 West 17th South St.
Boston, 10	1025-201 Devonshire St.	Los Angeles, 17	1523 General Petroleum Bldg.	San Francisco, 4	1554—200 Bush St.
Chicago, 4	2128 McCormick Bldg.	New York, 6	3347—165 Broadway Bldg.	Seattle, 1	1325 Henry Bldg.
Cleveland, 15	2204 Midland Bldg.	Philadelphia, 3	1615—1700 Walnut Street Bldg.	Tulsa, 3	1308 Hunt Bldg.

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Construcciones Metalliques de Provence, Arles-sur-Rhone, France
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Comprima, N.V., 21, Amstel, Amsterdam (C) Netherlands
Compagnia Tecnica Industria Petroli, Rome, Italy
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Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Sociedade Chibridge de Construcoes Ltda., Av. General Justo, 275, Grupo 306, Rio de Janeiro, Brazil

SOUTHWEST

Gathering Tax Urged

T.I.P.R.O. committee wants valid tax on gas gatherers

AUSTIN.—The executive committee of the Texas Independent Producers and Royalty Owners Association meeting here March 1 reaffirmed its position that any additional revenue from oil and gas operations in Texas should come from a "tax on gas gatherers."

Speaking for the committee, M. D. Bryant, president of the association said it believes that a constitutional tax on the so-called gas gatherers could be written at the upcoming special session of the Texas Legislature. These interests, he said, "so far have escaped their share of the tax burden."

Producer exemption urged . . . The committee also adopted a resolution calling on Texas members of the U. S. Senate and House of Representatives to press for congressional action to exempt gas producers from Federal Power Commission jurisdiction if the Supreme Court sustains federal regulatory authority in the Phillips case.

The resolution urged that no further action be taken on the Hinshaw bill, which would exempt intrastate gas distribution from federal regulation, until the Supreme Court decides on the Phillips case.

In the event the court upholds the extension of federal authority over independent producers and gatherers, the resolution urges that the Hinshaw bill be amended to include the same exemption for producers and gatherers as for intrastate distributors. The Hinshaw bill has passed the House and has been recommended by the Senate interstate and foreign commerce committee.

Bryant declared that "unless the Supreme Court holds in the impending Phillips case that FPC jurisdiction does not apply to independent production and gathering of gas, the entire oil and gas industry will find itself in jeopardy of a type of utility regulation under which it cannot meet responsibilities to the nation."

Products Storage Asked

AUSTIN.—Gulf Oil Corp. is seeking Texas Railroad Commission permission to leach out a 150,000-bbl. cavity in Fannett field, Jefferson County, about 14 miles southwest of Beaumont, for storage of petroleum products.

Products to be stored in the cavity presumably would come from the company's big Port Arthur refinery about 20 miles to the southeast.

At a hearing before the commission last month, Reuben F. Thomas, Gulf petroleum engineer, said the cavity would be leached out of a salt section underlying Gulf's E. Thomas et al lease at about 2,113 ft.

Gulf, Thomas said, expects 96 to 98 per cent recovery of products from the cavity on the first cycle withdrawal, a higher percentage on subsequent withdrawals.

Floods Get Approval

Smaller water-injection projects granted permits

AUSTIN.—The Texas Railroad Commission has approved plans of operators to launch a number of small water floods in South Ward field, Ward County, West Texas.

Permission to carry on water-injection operations has been granted within the past 2 weeks to Forest Oil Corp., San Antonio; N.C.R. Oil Co., Kermit, Tex.; V. L. Drilling Co., Borger, Tex.; Hamilton Brothers; Barron Kidd, Dallas; and D. D. Feldman Oil & Gas Co., Dallas. All applications are to flood the Yates (Grand Falls) zone at roughly 2,200 ft.

Forest Oil plans to flood an area totaling 1,000 acres underlying its A. B. Gordon, A. B. Gordon "B," Johnson "A" and "B," and J. F. York "B" leases. The company would use an open-type system and a five-spot injection pattern. Water would be obtained from freshwater sands at 150-200 ft. Testimony at a commission hearing disclosed that the holdings are depleted so far as primary production methods are concerned.

N.C.R. Oil's plan is to flood the Yates under its John Miller lease using its No. 2 well for injection. V. L. Drilling will flood its H. J. Porter and Williams leases using one injection well. Hamilton Brothers will flood its B. H. Grube and W. Kreps leases using four wells for injection.

Barron Kidd will flood the John Miller, W. H. Myers, and J. S. Reynolds leases, using seven wells for injection.

D. D. Feldman will flood its Olcott, Maxwell, and Dorr leases, using 14 wells for injection.

Other permits . . . Permits were issued to Frank Wood Associates, Inc., to flood the 1,700-ft. Cisco sand underlying the operator's Wittenbach, Volkhart, and Scales leases in Wichita County Regular field, Wichita County, North Texas, using four wells for injection.

Frost & Porter will flood the Pueblo at 415 ft. under the Dallas and Landrum leases in Callahan County Regular field in Callahan County, North Texas, using three wells for injection.

Geochemical Surveys plans to inject water into the upper Gardner at 3,850 ft. to determine the feasibility of water flooding its properties in South Crews field, Runnels County, West Texas.

All permits were issued under standard commission regulations for possible later addition of more injection wells and for allowables of wells used for injection to be transferred ratably to all other wells on the respective leases.

Partnership Reorganizes

LONGVIEW, Tex.—George & Wrather Oil Co., formerly a partnership of T. W. George, F. O. Penn, John Wrather, and L. E. Martlew, has been reorganized here as a corporation under the same name and with an authorized capital stock of $1,000,000.

President of the new corporation is George. Wrather is chairman of the board, and Penn is vice president. Directors in addition to Wrather are George, Penn, and Martlew.

George & Wrather Oil operates 215 leases with 530 wells in the Tri-state area of Illinois, Indiana, and Kentucky. The wells currently are producing about 4,000 bbl. of oil daily. The company also operates about 30 leases in Texas with 90 wells producing about 1,170 bbl. of oil daily and has holdings in North Dakota, Oklahoma, Montana, and Wyoming.

NORTHWEST

Crude Line Planned

VANCOUVER, B. C.—Construction is scheduled to begin May 1 on a pipe line to move Canadian crude to the now-building 35,000-bbl. refinery of General Petroleum Co. at Ferndale, Wash.

The line, to be built by Trans Mountain Oil Pipe Line Corp., will involve 26.6 miles of 20 and 16-in. pipe and will cost more than $2,000,000. It is scheduled for completion September 15. Bids will be sought this month.

The project calls for 15.3 miles of 20-in., running from the Canadian border to a junction near Laurel, Wash. The 16-in. line will run from this point to the General Petroleum refinery. At the Canadian border the line will take crude from a 24-in. spur from Trans

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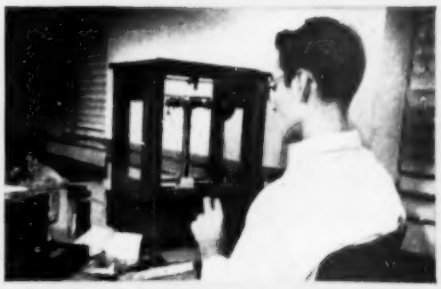

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One method of obtaining data on corrosion rates consists of accurately weighing small metal coupons before and after placement in process lines. Your Visco Representative can help you select a means of proving the effectiveness of Visco corrosion control in your equipment . . . with no obligation to you. Write or phone for action now.

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Mountain Oil Pipe Line Co.'s big crude line from Alberta.

Next year the company will extend the 20-in. line southward from Laurel Junction 27 miles to a point near Mount Vernon, with a 16-in. extension westward to serve the 50,000-bbl. Shell Oil Co. refinery at March's Point, near Anacortes.

CANADA

Looping Contracts Awarded

EDMONTON, Alta.—Interprovincial Pipe Line Co. and its American affiliate, Lakehead Pipe Line Co., have let contracts for 454 miles of looping in Canada and another 150 miles of looping lines in the United States.

Two Canadian sections on the Edmonton-to-Sarnia line have been awarded to Anderson International Contractors, Ltd., here. One, for 101 miles, is between the east bank of the South Saskatchewan River and Regina and the other, 100 miles, will complete the paralleling of the company's system between Regina and Gretna, Man. Both sections will be 24-in. line.

Mannix, Ltd., of Calgary, will lay 129 miles of 24-in. line between Edmonton and the Alberta-Saskatchewan boundary.

Contract for 125 miles of 24-in. line linking the Mannix job and that done by Anderson was let to Fulton-Bannister, Ltd., Canadian subsidiary of R. H. Fulton & Co., Lubbock, Tex.

The parent Fulton company was awarded the contract for a 104-mile section of 26-in. loop from the Canadian border southeast and for a 43-mile section northwest from Duluth, Minn.

Construction is scheduled to start April 1.

Sulfur Output to Double

CALGARY, Alta.—Shell Oil Co. of Canada will more than double production of elemental sulfur at Jumping Pound, Alberta, before the end of this year.

A contract will be let within the next few weeks for additional facilities which will increase capacity for daily recovery of sulfur from hydrogen sulfide from the present 27.5 tons to over 57 tons per calendar day.

The sulfur project will cost an estimated $500,000. Concurrently, Shell will triple the production, processing and delivery of natural gas at Jumping Pound. On completion of this program, Shell will be delivering 70 million cu. ft. daily to Canadian Western Natural Gas, which serves the Calgary area.

Shell sulfur is now going to British Columbia pulp and paper manufacturers. The additional production will be moved by rail 600 miles to the northwest where it will be converted to sulfuric acid to be consumed in the recovery of uranium at Beaverlodge, Alta., by Gunnar Gold Mines.

Shell Takes Large Farmout

CALGARY, Alta.—Shell Oil Co. of Canada, Ltd., has taken an 185,000-acre farmout from Petrol Oil & Gas Co., Ltd., in one of the largest Canadian land deals in a number of months.

The acreage is 23 miles southeast of Canadian Gulf Oil Co.'s 12 Little Smoky, a 1953 D-3 production discovery, and about 30 miles from D-3 production at Sturgeon Lake. It includes townships 62, 63, and 64, ranges 25, 26, and 27.

Petrol retains 7.5 per cent interest plus a 25 per cent working interest in one quarter of each section under lease.

MID-CONTINENT

Champlin Selling Out

Chicago Corp. negotiates for Oklahoma refining firm

ENID, Okla. — Negotiations were under way here last week for the sale of Champlin Refining Co., longtime independent refining, producing, marketing and transporting firm to Chicago Corp., of Chicago and Corpus Christi.

Joseph N. Champlin, president of the Oklahoma company, and Earl Baldridge, executive vice president of the Chicago firm, disclosed the impending sale, but neither would confirm or deny reports of a $55,000,000 consideration involved.

Champlin said the sale would involve the name, good will, wells, refinery, pipe lines and all other assets operated as a part of the company "including a subsidiary, the Peppers Refining Co. of Oklahoma City."

In addition to a 22,000-bbl. capacity refinery at Enid, which has been operating at less than half that capacity, the Champlin firm owns about 400 producing wells in Oklahoma, Kansas and Texas averaging 10,000 bbl. daily on 5,000 acres of proved leaseholds. It holds another 600,000 acres of undeveloped acreage in Oklahoma, Texas, Colorado, New Mexico, Louisiana, North Dakota and Nebraska.

Its pipe-line subsidiary, Cimarron Valley Pipe Line Co., operates 385 miles of line gathering 60,000 bbl. a day from Oklahoma fields. Its drilling subsidiary is the Oven Drilling Co.

Chicago Corp. holdings . . . Formerly an investment company, Chicago Corp. is now primarily a producer of oil and natural gas. Its last security holdings in Parkersburg Rig & Reel Co. were sold in July 1953.

The firm's crude production in 1953 averaged about 5,200 bbl. daily principally from leases in Texas. Last year Chicago Corp. owned varying interests in 304 gas wells and 229 oil wells and held leases on 531,165 acres, of which about 80,000 is proved.

In addition to producing properties, the company owns a 25 per cent interest in Great Southern Chemical Co., 50 per cent of Midland Gasoline Co., and 14 per cent of Atlas Processing Co.

Acquisition of the Champlin interests would give Chicago Corp. its first refining and pipe-line properties.

Arrow Drilling Co. Sold

TULSA. — Sale was completed last week of Arrow Drilling Co. of Oklahoma and its affiliates, Arrow Drilling Co. of Texas and Arrow Drilling Co. Canada, Ltd., to Henry Rogers Benjamin, New York investor, and a group of associates.

The transaction included all properties of the firms. The number of rigs, producing properties, or amount of money involved were not made public by the company.

Arrow is one of the larger contract drilling firms and in 1953 operated 17 rotary rigs. Besides its Tulsa headquarters, Arrow has offices in Odessa and Tyler, Tex.; Denver, and Calgary, Alta.

I. P. Patton, Jr., has become president of the firm, replacing W. S. Churchill of Dallas, principal stockholder of Arrow before the sale, who is now chairman of the board of directors.

Other officers were moved up "in their normal lines of promotion," according to the company. M. D. McBride has become executive vice president; D. L. Edmiston, vice president in charge of production and land; G. J. Churchill, vice president in charge of drilling equipment and operations; and S. M. Blevens, vice president in charge of contracts.

GLASS GUN INCREASED PRODUCTION FROM SHOW TO 960 BOPD!

Two previous perforating jobs with conventional jet charges had failed to open flow channels for the oil

Production from a well in a conglomerate formation still remained negligible after two attempts to perforate with conventional jet charges. It was thought that the producing section had been mudded off when the well was drilled in.

In another effort to bring in the well, the operator decided to perforate with the Dowell Glass Gun, using GG-4 charges. Within a few hours after Dowell engineers did the job, the well was producing at the rate of 960 barrels of oil per day!

Drum tests through casing into cement and sand demonstrate the extra value you get in perforating, when you use Dowell Perfojet Service with the Glass Gun. In such tests, Glass Gun charges have shown larger hole sizes and twice the penetration of conventional charges.

Four sizes of charges permit Glass Guns to be tailor-made to fit a wide variety of shooting patterns and hole sizes. Charges can be set to fire in single, double, or triple vertical rows, and at angles up to 30° from horizontal. Because it is self-destroying, there is no danger of hanging the gun in the casing after firing. The well is left junk-free.

Dowell Electric Pilot equipment is used in Glass Gun perforating. These sensitive recording instruments give the engineers finger-tip control over the entire operation. Dowell's active safety program is planned to protect both personnel and well equipment. And Dowell research is aimed to give you more profitable perforating jobs.

For more information about how Dowell Glass Guns can help you, contact your nearest Dowell Station. Or, if you prefer, write directly to Dowell Incorporated, Tulsa 1, Oklahoma, Department C-11.

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FOR OIL INDUSTRY CHEMICAL SERVICE

World Output Rises

Venezuela and Middle East production records in December outrun 1953 forecast to a total of 11,832,000 bbl. daily

RECORD high production rates in Venezuela and the Middle East lifted total Free World output of crude oil by approximately 223,000 bbl. daily, or 1.9 per cent, in December.

The increase, the first since last July, was entirely due to higher output levels abroad. United States production declined slightly during the month.

Venezuelan output surged upward, for the first time topping the 1,900,000-bbl. daily mark. Middle East production showed an unusually large month-to-month increase of 195,700 bbl. daily, or 8.3 per cent, most of it due to near-record production in Kuwait.

During December, Free World production averaged approximately 11,956,100 bbl. daily, up 223,200 bbl. daily, or 1.9 per cent over November. This brought total 1953 non-Communist World production to the slightly higher-than-forecast average of 11,832,000 bbl. daily. It compares to 11,220,400 bbl. daily in 1952.

The December increase in output followed 4 months of successive declines. During 1953, production rose sharply during the second quarter, principally as a result of a great expansion in the Middle East. The second half of the year was marked by declines caused by cutbacks both in the United States and in foreign fields.

Non-Communist gain . . . Non-Communist production in December averaged a record high 5,718,100 bbl. daily, up 262,400 bbl. daily, or 4.8 per cent. This brought the 1953 foreign average to 5,366,000 bbl. daily, a gain of 408,000 bbl. daily, or 8.2 per cent over 1952. During 1953, the trend of foreign production was generally upward during the first half, and, with the exception of December and October, downward during the second 6 months.

Total production of the Middle East during December slightly exceeded the region's previous all-time high of 2,536,000 bbl. daily last June. Kuwait's output during the month of 948,300 bbl. daily was only slightly under the previous record of 950,300 bbl. daily in October. Kuwait Oil Co., Ltd.'s production is reported in long tons, and slight differences in the barrel total are sometimes caused by the use of different conversion factors based on gravity.

The other three leading production countries in the Middle East all showed gains in December. Saudi Arabia was up 48,100 bbl. daily Iraq, 12,600 bbl. daily, and Qatar, 17,200 bbl. daily.

Of Iraq's total production, 484,100 bbl. daily was from Kirkuk field, and 75,100 bbl. daily from Zubair field. Mosul Petroleum Co., Ltd., reported 23,600 bbl. daily, coming not only from Ain Zalah but also from the newly producing Butmah field. The remaining Iraq production was from Khanaqin field.

TREND OVER THE LAST YEAR

1953—	W. Hemisphere less U. S.	Middle East	Total non-Communist foreign
January	2,472.8	2,252.3	5,152.2
February	2,407.2	2,258.4	5,096.8
March	2,412.5	2,266.1	5,104.8
April	2,448.1	2,426.8	5,306.6
May	2,423.1	2,523.7	5,391.0
June	2,459.4	2,536.0	5,450.1
July	2,487.7	2,534.0	5,471.9
August	2,443.3	2,489.0	5,387.3
September	2,485.7	2,416.4	5,345.3
October	2,519.5	2,528.1	5,511.5
November	2,646.0	2,341.7	5,455.7
December	2,704.0	2,537.4	5,718.1

Middle East gains 16 per cent . . . Total production in the Middle East for 1953 amounted to 2,426,000 bbl. daily, a gain of 16.4 per cent over 1952. Kuwait averaged 861,400 bbl. daily, for the first

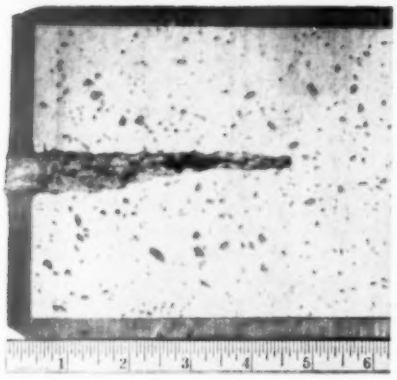
CRUDE-OIL PRODUCTION
(Daily average in thousands of barrels)

Country—	Dec. 1953	Nov. 1953	Dec. 1952
W. Hemisphere:			
Argentina	82.0	82.8	73.8
Bolivia	2.9	2.6	1.3
Brazil	2.1	2.0	2.2
Canada	256.0	253.1	187.5
Chile	4.7	4.6	3.2
Colombia	106.2	108.2	104.0
Cuba	0.1	0.1	0.1
Ecuador	8.5	8.5	8.1
Mexico	200.0	205.0	215.8
Peru	45.0	45.5	44.4
Trinidad	61.3	62.5	60.0
Venezuela	1,935.2	1,871.1	1,861.0
Total	2,704.0	2,646.0	2,561.4
Europe & Africa:			
Algeria	1.7	1.8	1.2
France	7.2	7.3	6.4
Fr. Moroco	2.2	2.2	2.1
W. Germany	45.0	45.0	37.6
Italy	1.7	1.8	1.9
Netherlands	16.7	17.1	12.3
Egypt	44.0	45.0	46.4
United Kingdom	1.0	1.1	1.1
Total	119.5	121.3	109.0
Middle East:			
Bahrain	30.2	30.1	30.0
Iran	19.5	23.1	23.0
Iraq	592.8	580.2	514.3
Kuwait	948.3	826.8	710.2
Qatar	86.3	69.1	81.2
Saudi Arabia	859.9	811.8	732.8
Turkey	0.4	0.6	0.6
Total	2,537.4	2,341.7	2,092.1
Other Asia:			
British Borneo	101.5	101.8	97.2
Burma	3.4	3.4	2.5
India	6.8	6.8	6.0
Indonesia	230.0	220.0	198.3
Japan	6.7	5.9	5.6
New Guinea	4.8	4.8	4.9
Pakistan	4.0	4.0	4.4
Total	357.2	346.7	318.9
Total, Non-Communist, foreign	5,718.1	5,455.7	5,081.4
United States	6,238.0	6,277.2	6,633.7
Total Free World	11,956.1	11,732.9	11,715.1
Est. Russia & E. Europe:			
Russian Occupation Zone of Austria	62.0	62.0	60.0
Romania	110.0	110.0	85.0
Russia	1,060.0	1,060.0	985.0
Other Communist	34.7	34.7	25.1
Total	1,266.7	1,266.7	1,155.1
World Total	12,222.8	12,999.6	12,870.2

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these regions. Estimates also have been made for certain other countries, particularly in Southeast Asia, for which completely current reports are lacking. Iranian production shown is net output, not including recycled material. Other Communist includes China and Yugoslavia as well as the Soviet satellite countries in Europe.

Welex

the LOW COST perforating service that gives deep, positive penetration with larger—diameter entrance holes...



Welex 5" Twin-Jet penetrates 4.7" through ½" steel plate into aged neat cement, with entrance hole diameter of ½".

Cross section through the Twin-Jet gun with the double jet charge in place. The jets perforate through metallic port plugs, leaving virtually no debris in the well, as port plugs and debris are retained in the gun. Visual inspection of the gun on coming out of the well reveals holes in the port plugs confirming clean perforations through the casing.

ASK YOUR WELEX SERVICE ENGINEER

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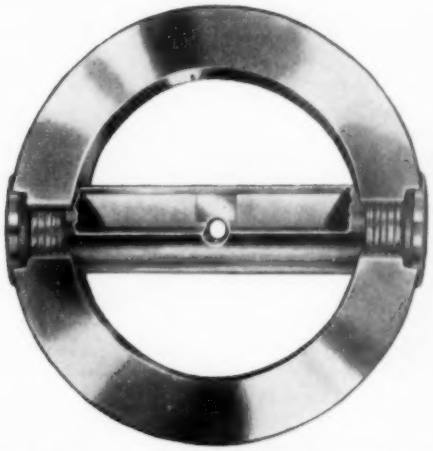

Twin-Jet gives you POSITIVE PENETRATION of casing, cement, and formation. There are no "duds."

Average DEPTH of penetration is GREATER than with projectiles.

Entrance hole diameter is equivalent to bullets.

There is virtually no burr left on the inside of the casing.

No casing damage... no shattering of the cement sheath.

Twin-Jet Guns are made in 4" and 5" O.D., giving a hole density of 4, 6, or 8 per foot from either size gun.

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time, leading Saudi Arabia's 840,000 bbl. daily to become the leading producing country of the Middle East. Iraq's production for the year averaged 576,000 bbl. daily.

Of the other countries in the Middle East, Qatar's output in December was up sharply from the depressed level of November. Production in this shaikhdom during the summer averaged close to 100,000 bbl. daily. Net production of the National Iranian Oil Co. declined in December. However, gross production of this government company amounted to 46,400 bbl. daily, of which 26,900 bbl. daily was recycled as products to the formations.

December was a banner month in Venezuela. After a slump extending from January through October, production turned up in November, reaching an all-time high of 1,871,100 bbl. daily. The December average of 1,935,200 was the second successive record, representing a gain of 64,100 bbl. daily over the previous month. For the entire year, however, Venezuela's production averaged 1,765,000 bbl. daily, down nearly 40,000 bbl. daily from the 1952 average.

Canada unchanged . . . Canada's crude output in December showed little change. This reflected commencement of movement of crude through the 1,700-mile pipe line to Sarnia as well as operation of the system to the Pacific Northwest. In previous years, production in Alberta has fallen off sharply when tanker shipments on the Great Lakes were suspended. The new Sarnia line avoids this water haul.

Colombian production declined slightly from the November total. Production by operators in December was: Intercol, 625 bbl. daily; Shell, 42,480 bbl. daily; Texas, 3,906 bbl. daily; Empresa, 33,930 bbl. daily; and Colpet, 25,214 bbl. daily. In addition, the Empresa produced 2,396 bbl. daily of condensate. Reports also showed twenty rigs were running in Colombia in December.

Production in West Germany in December amounted to 45,000 bbl. daily (197,189 metric tons), giving a total for the year of 42,400 bbl. daily (2,187,934 tons). In the Emsland, production was again restricted in December, but in the Hanover, Weser-Ems, and Holstein areas, output was stepped up by about 6,000 tons as against November.

Some addtiional crude oil production is now credited to Romania, but the amount is considerably less than what is claimed by the Communist authorities of this Iron Curtain country. Qualified western observers believe oil production may be running as high as 5,600,000 tons, or about 112,000 bbl. daily. By contrast, the government claims some 11,000,000 tons, or 220,000 bbl. daily. There are grounds to believe that this latter figure includes the calorific value of natural gas converted to liquid equivalent, plus natural gasoline, and all reported under inclusive heading of petroleum production.

British Stall Solution

Anglo-Iranian insistence on large share of Iranian oil retards settlement, may cause balk by Zahedi government

PROGRESS toward an Iranian oil settlement has been slowed by the fact that the British are insisting on better than 50 per cent control of the proposed international consortium of companies.

Reports of a disagreement on this phase of the problem last week tended to bear out rumors which have been circulating in the industry.

American officials participating in the consortium negotiations are represented as fearing a proposal including majority British control would be difficult if not impossible to put across in Iran. Ultranationalist Iranian sentiment continues strong with much popular feeling against any possibility of British domination.

Representatives of eight international oil companies have been meeting in London since early January to work out the complex details of the international group that will take over distribution and also exercise some degree of control of actual operations of the Iranian oil industry.

British want lion share . . . The problem that has arisen concerns the share in the joint undertaking to be assigned to Anglo-Iranian Oil Co., Ltd. The producing and refining properties which Anglo-Iranian built up in Iran over a period of nearly 50 years were nationalized in 1951.

Reports from London last week said the British were insisting on 44 per cent of the consortium for Anglo-Iranian. If the 8 per cent to be assigned to Royal Dutch-Shell is included, the British interest could thus be interpreted as amounting to 52 per cent. Royal Dutch-Shell is 40 per cent owned by Shell Transport & Trading Co., Ltd., and has joint marketing operations with Anglo-Iranian in some parts of the world, including the United Kingdom.

There was no indication as to whether the Zahedi Government in Iran would accept such an arrangement.

It was understood that the British originally sought a higher share than 44 per cent for Anglo-Iranian. The British are said to feel that an industry which was founded and developed by British enterprise should remain in British hands. The Americans on the other hand contend this position ignores the realities of the situation.

The American companies—Standard Oil Co. (N. J.), Standard Oil Co. of California, The Texas Co., Socony-Vacuum Oil Co., Inc., and Gulf Oil Corp.—and the French Cie. Francaise des Petroles would receive the remaining 48 per cent in shares of 8 per cent each, under the proposal for a 44 per cent share for Anglo-Iranian.

Reports are that the British are being asked to lower the Anglo-Iranian interest to 40 per cent, and that this question, along with some other final problems in connection with the consortium, would be discussed by top executives of the companies who were expected in London.

How it would work . . . Recent reports indicate the consortium would in effect buy Anglo-Iranian's interest in the Iranian oil industry, including the properties which the company had in its concession area. Anglo-Iranian would thus obtain part of its compensation from the sale of the shares in the organization. Other funds would be provided for rehabilitation and working capital. The consortium would then handle Iranian oil on a 50-50 profit-sharing basis, the same as in other countries of the Middle East, and Iran would pay its compensation to the consortium.

Officials familiar with the matter emphasize that the American oil companies were from the first not at all anxious to enter the Iranian industry and are only doing so at the urging of the United States Government which gave antitrust immunity in connection with the joint undertaking. One unanswered question is whether American companies other than the five major international firms will be given a chance to take part.

Sharmex Well Completed

Southeast of the Golden Lane in Veracruz, Sharmex, one of the companies working under contract to Pemex,

has completed Horcon 114, also known as Ocotepec 106, at about 3,400 ft. The well was reported to have tested about 3,000 bbl. daily initial production.

The rig is now being moved to Horcon 115 about 660 ft. southeast of the latest completion. When Horcon 115 is completed, Sharmex will have developed a hexagonal-shaped field centering around the discovery well, Horcon 101. Pemex currently is taking about 10,000 bbl. daily from the Sharmex development.

Exploration Extends

Eastern Australia target of five new organizations

EASTERN Australia is in line for exploration programs proposed by five groups as the search for oil in the country gains momentum after an oil discovery in western Australia late last year.

Four groups have formed firms to carry on exploration programs in western Australia, and another firm has a group of geologists preparing to begin a preliminary survey. All five groups plan their exploratory work in Queensland.

Cable Oil Syndicate has organized an oil exploration company, with capitalization of £5,000,000, to prospect on Reid's dome near Consuello, Rolleston, Queensland.

Gene Goff of Tulsa, has formed Oil Drilling & Exploration, Ltd., to test a structure at Maryborough, Queensland, which is under lease to Lucky Strike Drilling Co., of which Goff is also president. Goff will purchase two rigs for Oil Drilling & Exploration which will also undertake contract drilling.

Associated Australian Oilfields has merged with Freney-Kimberley in Associated Freney Oilfields, with capitalization of £4,000,000. Associated is currently drilling near Roma, Queensland, and Freney-Kimberley has leases in western Australia.

Westland Oil Co. has been formed to prospect in the region of Longreach, Queensland.

Frome-Broken Hill Co. Pty., Ltd., has a group of geologists en route to the Cape York Peninsula in northern Queensland to start a preliminary survey for oil exploration in the region.

The discovery which set off the rapidly growing exploration activity was the Rough Range 1 well of West Australia Petroleum Pty., Ltd., which was tested for a flow of light oil at a rate of better than 550 bbl. daily at 3,600 ft. *(The Oil and Gas Journal, December 14, page 99).* The company is drilling ahead to evaluate thoroughly the prospects of the area near Exmouth Bay about 600 miles north of Perth.

Venezuela Using Gas

Two new plants which contribute to the gas-utilization program in Venezuela have been placed in operation in Anzoategui State in the eastern part of the country.

The gas absorption plant at West Guara, a joint undertaking of Mene Grande Oil Co. and Creole Petroleum Corp., has a maximum capacity to handle 40,000,000 cu. ft. of wet gas daily, recovering some 1,260 bbl. daily of natural gasoline. Dry gas is returned to West Guara field. The injection phase of the project considerably expands facilities first built in 1948 and enlarged in 1951.

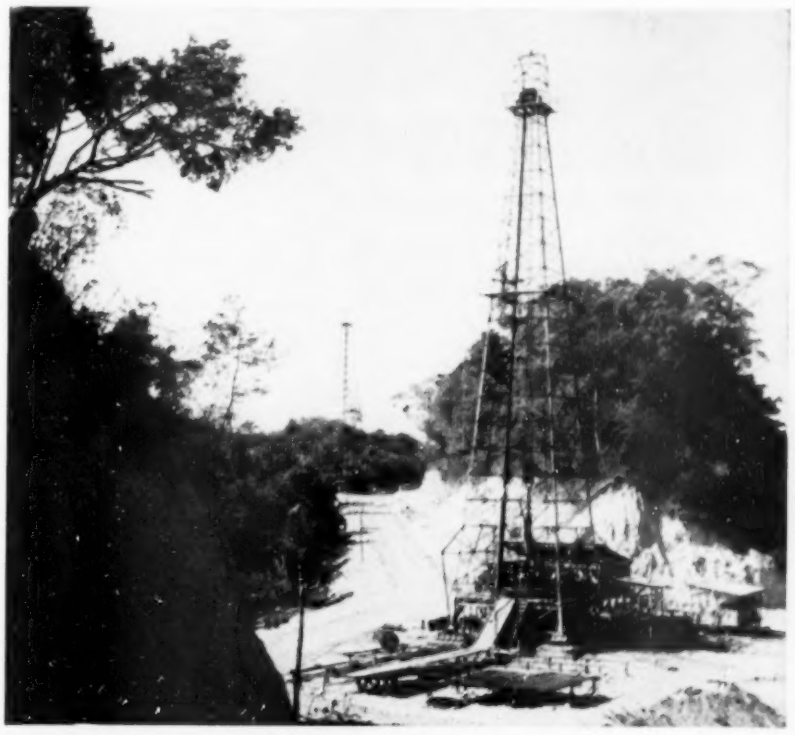
The second plant is for compression and injection of gas in Chimiri field. Facilities consist of five 1,320 hp. compressors with a total capacity of 37,300,000 cu. ft. daily at a maximum pressure of 2,200 psi. Twelve flares were eliminated as the plant came into operation. It is a joint undertaking of Creole, Mene Grande, and Socony-Vacuum Oil Co. of Venezuela.

At the inauguration, Dr. Edmundo Luonga Cabello, minister of mines and hydrocarbons, said the plants illustrated Venezuela's continuing progress in eliminating gas waste. The Chimiri plant will allow an increase of an estimated 30,000,000 bbl. in ultimate oil recovery. Several years ago, ministry studies showed the possibility of substantially increased recovery through pressure maintenance in this area, and the companies involved were asked to regard their concession boundaries as non-existent for the purposes of conservation. A unit operation in this oil zone resulted.

Rig Shipped for Test

Petroleos Mexicanos has shipped a rig and other equipment by boat from the west coast port of Mazatlan to carry out a new wildcat test in Lower California

The location is near the Bay of San Jacinto in the municipality of La Purisima. A California contractor drilled a test 2 years ago for Pemex in the northern part of Lower California with negative results, but the new well will be the first in the semiisolated southern section of the peninsula.



Export Sales Increase Pemex Activity

Conditions on the producing side of the Mexican oil industry have improved recently with a pickup in export sales of heavy oil. Output, which slumped badly last year, has been increased, and development work has been resumed in some of the producing areas. Petroleos Mexicanos' original goal was for the drilling of 400 wells this year. The wells shown here are in the Miguel Aleman area near Papantla south of Poza Rica.

Egypt Deals for Oil

Russia, Romania to trade oil for Egyptian cotton

THE Egyptian Government has negotiated an agreement with the Soviet Union and Romania calling for a $11,500,000 barter trade in oil and cotton.

An Egyptian Ministry of Commerce and Industry statement in Cairo said the oil would be supplied by Russia and Romania at prices 16 per cent below world market levels and that the proceeds would be used to buy Egyptian cotton on the free market.

The agreement calls for the supply of 350,300 tons (about 2,450,000 bbl.) of oil products, consisting of 230,000 tons of kerosine, of which 200,000 tons will come from the Soviet Union; 55,300 tons of gasoline, including 25,000 tons from the Soviet Union; 55,000 tons of "solar" oil, including 25,000 tons from the Soviet Union, and 10,000 tons of fuel oil from Romania.

The oil imports will be moved to Egypt by the newly formed Egypto-Italian Tanker Co., according to information from Cairo. Egyptian interests have formed a company, Nile Valley Oil Co., which plans to build storage facilities at Alexandria to receive the Russian and Romanian oil.

Russia more active . . . The amount of oil which will be supplied under the agreement amounts to slightly less than 10 per cent of Egypt's annual consumption of about 3,750,000 tons. The deal is the most recent of a number of trade agreements negotiated by Russia with Western countries and offering Iron Curtain oil in exchange for other commodities. These agreements indicate that Russia and its satellites will supply between 80,000 and 90,000 bbl. daily this year to 14 nations, 10 of them in Western Europe.

Russia reentered the world oil trade last year as an important factor for the first time since the early 30's. In 1952 its exports to the non-Communist world were equivalent to about 40,000 bbl. daily. The reparations agreement under which Romania supplied about half its production to Russia ended some time ago, but the exchange rate for the Romania leu was changed in such a way as virtually to prohibit direct Romanian exports to the West and favor their disposal to the Soviet Union.

Production drops off . . . Egypt's consumption is equivalent to approximately 75,000 bbl. daily. About 45,000 bbl. daily has in the past been provided by domestic crude production. However, exploratory work was at a standstill in the country for several years, because of the unfavorable legal situation, and a drop in production from the Sinai fields, which have porous formations and a water drive, has long been forecast.

These predictions began to materialize recently when production from Asl field, one of the two in the Sinai operated by Anglo-Egyptian Oilfields, Ltd., and Socony-Vacuum Oil Co., Inc., dropped from about 10,000 bbl. daily to less than 600 bbl. daily.

Exploration in Egypt was resumed last year by Southern California Petroleum Corp. in the southern Sinai on behalf of International Egyptian Oil Co. Some additional crude has been developed, but it is not yet being commercially produced.

Amerada Won't Participate

Amerada Petroleum Corp. is not participating in the Egyptian exploratory undertaking planned by Conorada Petroleum Corp.

Conorada was formed in 1948 as the foreign exploration organization of Continental Oil Co., Ohio Oil Co. and Amerada, but under the original arrangement, any of the partners may elect to stay out after a proposal has been presented.

A. Jacobsen, Amerada president, pointed out that opinions can differ on such propositions, and said that his company had chosen not to participate in this particular venture.

The Egyptian venture *(The Oil and Gas Journal, February 16, page 106)* thus a joint undertaking of Continental and Ohio, will be carried out over a section of the Western Desert which with the included offshore acreage covers some 80,000 square miles, or considerably larger than the State of Oklahoma. A quick start on a major program is called for by the contract expenditure obligations. Six or more seismograph parties will probably be operating in the region by year's end.

Refinery Nears Completion

The Portuguese company, SACOR, has completed part of the distillation section of its modernized and enlarged refinery at Cabo Ruivo near Lisbon and is now running 1,200 tons, or about 9,000 bbl. of crude daily.

Completion of the remaining distillation equipment will raise capacity to 3,400 tons, or about 25,400 bbl., daily, but the company will not reach capacity operations until new storage facilities are finished. The catalytic cracking unit of about 10,000 bbl. daily capacity, originally scheduled to be ready in March, is now expected to go into operation in May.

The SACOR company (S. A. Concessionaria de Refinacao de Petroleos em Portugal) in which the government has about a third interest, holds exclusive rights for oil refining in the country. The modernization and enlargement program was undertaken as a result of the renewal of its agreement with the government in 1951. Previous capacity of the Cabo Ruivo plant was about 10,000 bbl. daily.

Venezuela Budget Boosted

The Shell organization's 1954 budget in Venezuela will amount to approximately $97,500,000, up about 9 per cent over 1953.

This was disclosed recently in Caracas by John H. Loudon, a managing director of the Shell Group who was for many years Shell's manager in Venezuela. On a visit to Venezuela, he said Shell had no further plans for expansion of refining capacity in Venezuela since Cardon can now handle 180,000 bbl. daily and San Lorenzo, 40,000 bbl. daily.

He indicated his belief that Venezuela is now at the economic limit of refining capacity. Because of the build-up of refineries in countries of consumption, he pointed out, what is now wanted are imports of crude, not products.

Commenting on Venezuela's production outlook, he reported that acidization had greatly improved the production of several wells in western Venezuela originally compelted in the Cretaceous limestone and later deepened into basement rock.

Colombian Line Completed

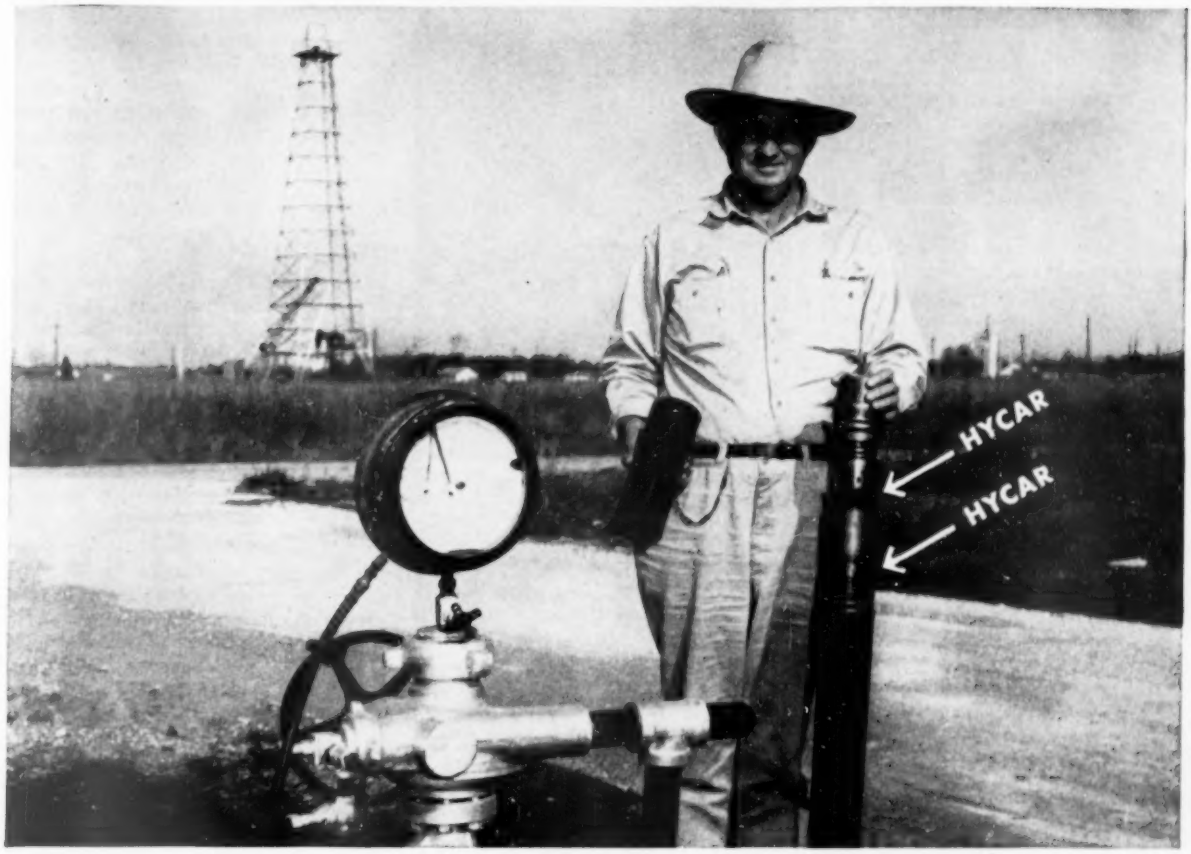
A new 91-mile, 8⅝-in. products pipe line from Cantimplora to Puerto Salgar along the Magdalena River in Colombia has been formally turned over to the government organization, Empresa Colombiana de Petroleos, by Williams Brothers Overseas Corp., the contractors.

The $3,500,000 line is the second part of a connection which will allow pipe-line deliveries all the way from the Barrancabermeja refinery to the Colombian capital at Bogota. It has a capacity of about 5,000 bbl. daily of motor fuel and other products.

Deliveries to Cantimplora are now made through a 6-in. line of invasion pipe which is being replaced with a new 90-mile 8⅝-in. by Anderson Brothers as contractors. The line from Puerto Salgar to Bogota was completed about a year and a half ago by Williams Brothers.

Another new development using

B. F. Goodrich Chemical *raw materials*



Cummings Gas-Lift Valve made by Cummings, Inc., Houston, Texas. Hycar sleeve supplied by Murray Rubber Company, Houston. B. F. Goodrich Chemical Company supplies only the Hycar rubber.

HYCAR-ARMORED VALVE BRINGS OIL UP—KEEPS TROUBLE DOWN

THE gas-lift valve pictured here does an important job in bringing up oil from wells that have too low natural pressure. It is unique, too—its only moving part is a Hycar rubber sleeve. In operation, this sleeve contracts and expands frequently, to permit entrance of gas into the tubing, and to seal off the pressure from the casing.

Ability to withstand this steady flexing and still retain resilience is one of the reasons Hycar was chosen for the sleeve. Equally important are Hycar's resistance to high temperatures and pressures and the harmful effects of oil, gas and other damaging agents encountered in an oil well.

Hycar's advantages make it ideal for packing elements, diaphragms, gaskets and other petroleum industry jobs—and applications in other fields. Perhaps a Hycar rubber compound can help you improve or develop more saleable products.

For helpful technical information, please write Dept. HJ-3 B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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PERSONALS

Iran Peacemaker

Herbert Hoover, Jr., adding distinction to famous name

SINCE Iran nationalized the holdings of Anglo-Iranian Oil Co., Ltd., more than 2 years ago, the Western World has waited apprehensively for the country's volatile internal situation to explode and drop Iran's prolific oil production into the lap of the waiting Russian Bear like a ripe hive of honey.

In the past few months, that apprehension has given way to cautious optimism. It is an optimism justified by more and more progress toward a settlement of the dispute and the return of Iran's oil to the free world markets.

An American with a famous name, acting as a representative of the United States, has probably done as much as any individual to bring about that change. Even though Herbert Hoover, Jr., acquired his noted name from his father, he has added luster to it in his own right.

Since his father—a former President of the United States—was a mining engineer and his mother was a geologist, perhaps it was only natural that Hoover should also be a mining engineer.

+ + +

But if he hadn't become interested in the crude seismograph of the early 1930's while working on an improved altimeter for the old Western Air Express, later Trans-World Airlines, he might today have been an executive in the aviation industry rather than an internationally known oil consultant.

Hoover was born in London, August 4, 1903, and in the next 4 years was taken around the world three times. He got his engineering education at Stanford University, graduating in 1925, and then went onto Harvard Business School where he received his degree in 1927.

His first job was with WAE and later Transcontinental and Western Air Express, where he was asked to develop an improved altimeter. When he found out what the seismograph could do, he left the company and built himself a seismograph truck. The venture eventually grew into the United Geophysical Co. which worked for oil companies and governments in all parts of the world. The company was acquired by Union Oil Co. in 1950, but Hoover is still chairman of its board and a Union director.

During the course of United's work,

HERBERT HOOVER, JR.

Hoover was called on for consulting jobs which led to his association with Duke Curtice and Glenn Ruby as the consulting firm of Hoover, Curtice and Ruby. This work took him to Brazil, Venezuela, Chile, Peru and, in 1944, Iran, where he got background knowledge of that country's oil industry which has been of great value to him as special advisor to the Secretary of State.

The many varying demands on their time gradually separated the three consultants and the working arangement eventually was dissolved. Hoover today has no business interests except those in Union Oil and United Geophysical.

Hoover is married to the former Margaret Watson, a graduate of his Stanford class and daughter of Douglas Watson, the discoverer of the Kettleman Hills field. They have a son and two daughters, all married, and five grandchildren. Hoover makes his home in Pasadena, Calif.

Hoover has a number of "little" hobbies and one big one which exemplifies his natural friendliness—amateur radio. He was a "ham" operator even before his father took over supervision of the then infant radio industry as Secretary of Commerce, and has continuously maintained his interest through the years, his call—W6ZH—being known to amateurs all over the world.

His present job for the State Department is the first service for which his own government has called him, the political climate in Washington for 20 years being, as he puts it, extremely cool for anyone named Herbert Hoover.

Leonard C. Thomas, geologist, has been elected a director of Saint Anne's Production Co. The firm is headquartered in Northwood, Iowa, but operates mainly in the Midland, Tex., area.

E. S. Marie, formerly Southwest Texas district geologist for American Republics Corp., has joined J. Ray McDermott & Co., Inc., oil division, as regional geologist in charge of the firm's new office at Corpus Christi.

Gen. Ernest O. Thompson, chairman of the Texas Railroad Commission, has been awarded the Order of the Liberator by the Venezuelan Government. The award, established in memory of Simon Bolivar, South American patriot, was presented to General Thompson for his work in oil conservation which the Venezuelan Government feels has greatly aided its country.

Joseph S. Pluta, formerly geophysical supervisor at Houston for Standard Oil Co. of Texas on the Gulf Coast and in Oklahoma, has joined Century Geophysical Co. in Tulsa as a supervisor. Prior to his Houston assignment, Pluta was senior geophysicist geologist in the company's Midland division office.

A. J. Singleton has been elected executive vice president of California Texas Oil Co., Ltd. He joined Galena Signal Oil Co. (Ireland), Ltd., in 1924 which was later acquired by The Texas Co. In 1931 he was appointed managing director of The Texas Co.'s English subsidiary in London and during World War II served as a director of the British Petroleum Board. He was made assistant vice president of Caltex when the firm acquired The Texas Co.'s European interests 2 years later. In 1948 he was made vice president in charge of marketing west of Suez and 3 years later was made vice president and director of the Caltex Group, a position he held until his present election.

O. L. Furse has been promoted by Humble Oil & Refining Co. from district superintendent at Athens, Tex., to assistant division superintendent at Tyler, Tex., replacing the late Clyde M. Vardaman. Furse will be succeeded as district superintendent at Athens by **Bert Crowder,** New London.

PERSONALS

Thomas P. Ross, Jr., geologist formerly with Hunt Oil Co. at Grand Junction, Colo., has joined Arabian American Oil Co. at Sidon, Lebanon.

W. H. STRONG

Walter H. Strong, vice president of Southern Production Co., Inc., has been transferred from Fort Worth to the firm's new office in Calgary, Alta., where he will be senior officer. **Kenneth W. Germond,** also transferred from Fort Worth where he was chief geologist, will be manager of exploration, and **James M. Hicks** has been moved from Swift Current, Sask., to be superintendent for drilling and production at Calgary.

Arthur R. Thayer has resigned as geologist in the Pegasus division of Socony-Vacuum Oil Co., Inc., to open offices as consulting geologist in Riverton, Wyo.

Wallace F. Armstrong has been advanced by Ethyl Corp. from manager of its Houston plant to the newly established position of assistant general manager of manufacturing with offices at Baton Rouge, La. He has been replaced at Houston by **Glenn O. Hays,** formerly acting assistant plant manager at Baton Rouge. **James J. Bergin,** also has been promoted from operations superintendent to assistant manager at Houston, a new position. **Melvin C. Hudgins,** formerly acting manager of maintenance and on-plant construction at Baton Rouge, has been named assistant manager there.

Charles F. Horton, Jr. has been promoted by Union Producing Co., subsidiary of United Gas Corp., from petroleum engineer at New Orleans to district petroleum engineer at Shreveport.

John A. Downing has been named vice president of the newly organized consulting firm of Link, Downing & Cooke, Ltd., formerly Link & Nauss, Ltd. He replaces **Dr. A. W. Nauss** who will devote all his time to managing and directing Scurry Oils, Ltd. **D. Y. Cooke** has joined the new firm, headquartered in Calgary and Toronto, as secretary-treasurer. **Dr. Theodore A. Link** is also president of the new firm.

Stuart A. Levinson, Humble Oil & Refining Co., Houston, and **Henryk B. Stenzel,** University of Texas, Austin, have been nominated for president of the newly organized Gulf Coast section of the Society of Economic Paleontologists and Mineralogists. Other candidates are: vice president, **Grover E. Murray,** Louisiana State University, Baton Rouge, and **Thomas H. Philpott,** Interstate Natural Gas Co., Shreveport; secretary, **William H. Akers,** The California Co., New Orleans, and **Louise Jordan,** consultant, Tallahassee, Fla.; treasurer, **Frank V. Stevenson,** Alcoa Mining Co., Houston, and **Lee A. Latta,** George May, consultant, Lake Charles, La. Voting will be by mail ballots.

A. J. Disalvo has joined **Harry Trueblood, Jr.,** Denver independent operator, as petroleum engineer. He formerly was with the U. S. Bureau of Mines, Petroleum Administration for Defense, and The California Co.

R. R. Davis, formerly a section chief with Sinclair Research Laboratories, Inc., Harvey, Ill., has been appointed assistant manager of the proceess materials division of Sinclair Refining Co.

HOLSAPPLE

Lloyd Holsapple, Tulsa, has been promoted by Sinclair Oil & Gas Co. from general staff engineer to chief petroleum engineer. **F. F. Wright,** formerly general staff engineer, has been named as Holsapple's assistant. **C. L. Wilson** has been advanced from general staff engineer

WRIGHT

WILSON

at Tulsa to engineering and technical assistant to the vice president and manager of production.

John M. Whelen, Sr., assistant traffic manager since 1929 for Pan American Petroleum & Transport Co. and its subsidiaries, has been promoted to general traffic manager, replacing the late R. Harry Maupin.

Wilburn T. Askew has been appointed general manager of Sun Oil Co.'s refinery at Marcus Hook, Pa., succeeding the late Charles E. Maschal. Askew joined Sun in 1931 and has been assistant manager of the refinery since 1952.

Frank G. Walter has been promoted by Standard Oil Co. (Ind.) from assistant superintendent of the mechanical division at the Wood River, Ill., refinery to superintendent of the mechanical division at the firm's new refinery now under construction at Mandan, N. D. Other changes from Wood River

Committee Plans A.P.I. District Meeting

Planning is being done by the general arrangements committee for the spring meeting of the Mid-Continent district of the American Petroleum Institute's Division of Production to be in Oklahoma City March 17-19. Seated are, left to right, Travis B. Phillips, Halliburton Oil Well Cementing Co.; R. B. McCloy, Decem Drilling Co., Inc., district secretary and treasurer; E. E. (Gene) Young, Sohio Petroleum Co.; Frank Willibrand, Sohio; Jack H. Abernathy, Big Chief Drilling Co., district chairman; A. C. (Bill) Rose, A.P.I.; and Fred Fellingham, Stanolind Oil & Gas Co. Standing are Paul Strasbaugh, Oklahoma City Chamber of Commerce; Howard B. Shelton, Sohio; and William D. Warner, Acme Tool Co. Fred J. Neslage, also a committee member, is not shown.

PERSONALS

A.I.E.E. Arranges First Oil Industry Meeting

Several members of the American Institute of Electrical Engineers are shown here as they met in Tulsa to arrange for the Electrical Conference for the Petroleum Industry to be in Tulsa September 27-29. It will be the first conference ever sponsored by the A.I.E.E. specifically for the petroleum industry. Left to right, seated, are Ralph E. Thornton, incoming chairman of Oklahoma City section of A.I.E.E. and superintendent of engineering for Oklahoma Gas & Electric Co.; J. Z. Linsenmeyer, chairman of the petroleum committee of A.I.E.E., Pittsburgh; and W. H. Stueve, consultant, Oklahoma City. Standing are V. J. Sittel, assistant chief engineer of Service Pipe Line Co., Tulsa, and Harold M. Furtney, of John W. Elder Co., Tulsa.

to Mandan include: **Delmond G. Bangert,** foreman of the utilities department, to the same post; and **Norman I. Ballard,** carpenter department foreman, to assistant general foreman in the mechanical department.

Joseph G. Lambert, geological engineer, has joined Earlougher Engineering, Tulsa. He was with Stanolind Oil & Gas Co. from 1948 until joining the petroleum department of Chase National bank of New York in 1950.

C. J. Hinshaw, Wichita Falls, Tex., has resigned from Tennessee Production Co. to become consulting geologist for Nash Oil Co., which was formed recently.

Victor Horner, Tulsa, has resigned as Mid-Continent division field service engineer for Baroid Sales Division of National Lead Co. to become secretary-treasurer of Don Johnson Drilling Co., Oklahoma City and Denver.

Van W. Rosendahl, formerly senior vice president of Bechtel Corp., San Francisco, has joined Rosendahl Corp., engineering construction firm, San Francisco, as chairman of the board.

Harris H. Allen has joined Ada Oil Co., Houston, as vice president in charge of land, geology, and production. He has been with Phillips Petroleum Co. for the last 7 years and was manager of the firm's Houston land and geological department when he resigned.

A. G. Budge, president of Castle & Cooke, Ltd., has been elected to the board of directors of Honolulu Oil Corp., replacing **George G. Montgomery,** who resigned recently.

DEATHS

John O'Donnell, 83, director of the Petroleum Publishing Co., which publishes The Oil and Gas Journal and Petroleo Interamericano and editor emeritus of The Oil City Derrick, died February 28 at his home in Oil City, Pa. Known as the dean of Pennsylvania newspapermen, O'Donnell was active in newspaper work 59 years and was editor and general manager of The Oil City Derrick for 22 years. He retired in 1950 but continued to serve as an officer and director of the company. O'Donnell entered newspaper work in 1891 as a reporter on the Pittsburgh Dispatch.

James Stanley Maxwell, 78, oil editor of the Wichita Falls, Tex., Times for 31 years before his retirement in 1952, died in Wichita Falls February 27.

A. Ludlow Clayden, 71, former head of Sun Oil Co.'s automotive laboratory at Marcus Hook, Pa., died recently at Swarthmore, Pa. He retired last July after 31 years with Sun.

Thomas E. Klipstein, 77, died recently in Bakersfield, Calif. He was an oil man in Kern County and one of the founders of Eight Oil Co.

Harry W. Kaley, 49, died March 1 in Auburn, N. Y. He was a vice president and director of Ethyl Corp. from 1944 until resigning in 1951.

Neil P. Jepsen, 61, an area supervisor for Esso Standard Oil Co. for 25 years, died recently in Clearwater, Fla., after a brief illness.

Alfred E. Burns, 46, chief marine dispatcher for American Oil Co.'s refinery at Carteret, N. J., died recently following a heart attack. He had been with the firm 25 years.

Errol John Hesser, 58, district superintendent for British-American Oil Producing Co., Houston, was killed in an automobile accident in Houston March 3.

C. E. Hyde, 59, Fort Worth geologist and independent producer, died in Fort Worth recently. Before going into business for himself, Hyde was vice president and chief geologist for the old Marland Oil Co. He left Marland when it was merged with Continental Oil Co.

Linton Jackson Glenn, 69, retired engineer for Magnolia Petroleum Co., died in Bluff Dale, Tex., February 28. Glenn joined Magnolia in 1924 and retired in 1949.

H. R. (Herb) Pennington, independent producer, died recently at Mount Vernon, Ill., following a heart attack.

NEW INTERNATIONAL MEDIUM-DUTY FOUR-WHEEL DRIVE TRUCKS

For Off-Highway or Highway Operation

Now, INTERNATIONAL Truck advanced engineering makes possible another development in transportation efficiency—*two new medium-duty four-wheel drive models* that open new possibilities for truck operators in scores of fields.

You can haul men, tools, equipment to any job—through mud, sand, and snow—over terrain where conventional trucks can't go. With front axle disengaged, you can operate normally on the highway.

Tough-job engineered. These new models are built for the toughest kind of work. Like every INTERNATIONAL, they give the low operating and maintenance cost and long life that have made INTERNATIONAL the heavy-duty sales leader for 21 straight years.

These new INTERNATIONAL 4x4 models have the stamina, ruggedness, and versatility for the toughest jobs. See one today. See how it fits your work. Time payments arranged. See your INTERNATIONAL Dealer or Branch for all the facts.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

New INTERNATIONAL R-140 (4x4) equipped for mineral exploration and seismic shot hole work in remote or swamp areas.

Brief Specifications of these new INTERNATIONAL medium-duty 4x4 models

Two chassis models. Model R-140 (4x4)—130 inch wheelbase, 60 inch CA; 142 inch wheelbase, 72 inch CA, GVW rating 11,000 lbs. Model R-160 (4x4)—154 inch wheelbase, 84 inch CA; 172 inch wheelbase, 102 inch CA, GVW rating 15,000 lbs.

All-truck power. Model R-140 (4x4), 100 hp. Silver Diamond 220 valve in head engine. Model R-160 (4x4), 108-hp. Silver Diamond 240 valve in head engine.

Eight forward speeds, two reverse. Transmission has four forward speeds, one reverse, with 2 speed transfer case.

Easily converted for highway use. Special transfer case permits disengaging front axle for normal 2 wheel drive operation.

Transmission power take-off openings on right and left side to handle front mounted winch.

International Harvester Builds **McCORMICK**® Farm Equipment and **FARMALL**® Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

Better roads mean a better America

INTERNATIONAL® TRUCKS

"Standard of the Highway"

NATURAL GAS

TO AMMONIA—1

A Look at Round 2 of NH_3 Expansion

A Series . . .

- **Kellogg-Montecatini**
- **Spencer Vicksburg Plant**
- **Foster Wheeler (Texaco-Casale-Pechiney)**
- **Partial Oxidation With Air**

These are some of the subjects covered in a new Journal series on nitrogen products manufacture.

by John C. Reidel
Petrochemical Editor

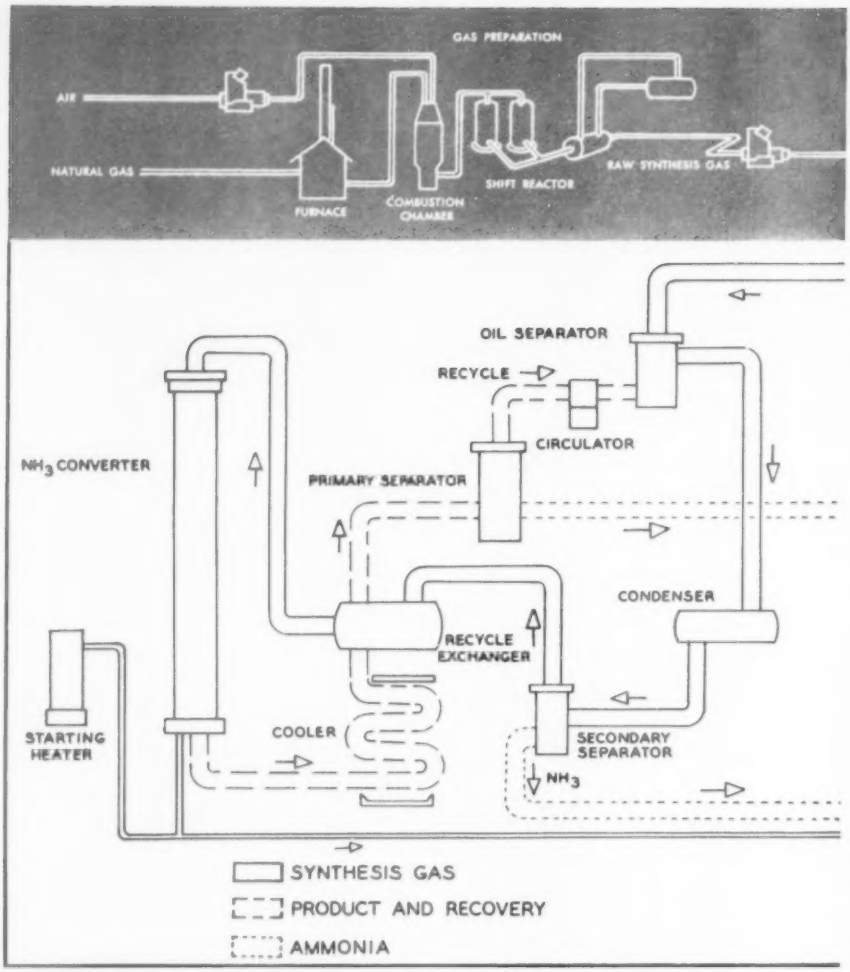


Fig. 1—KELLOGG AMMONIA PROCESS—Steam-methane reforming at elevated pressure is

Here is one process scheme: (1) steam-methane reforming at elevated pressure, (2) near-isothermal ammonia converter, (3) Montecatini urea manufacture.

NITROGEN chemicals manufacture has been one of the fastest-growing developments in the petrochemical industry. Most of the ammonia industry in the United States is now based on natural gas. A number of plants based on natural gas were constructed in the first round of ammonia expansion during the war. In the present round of expansion nearly all the new ammonia capacity is based on natural gas.

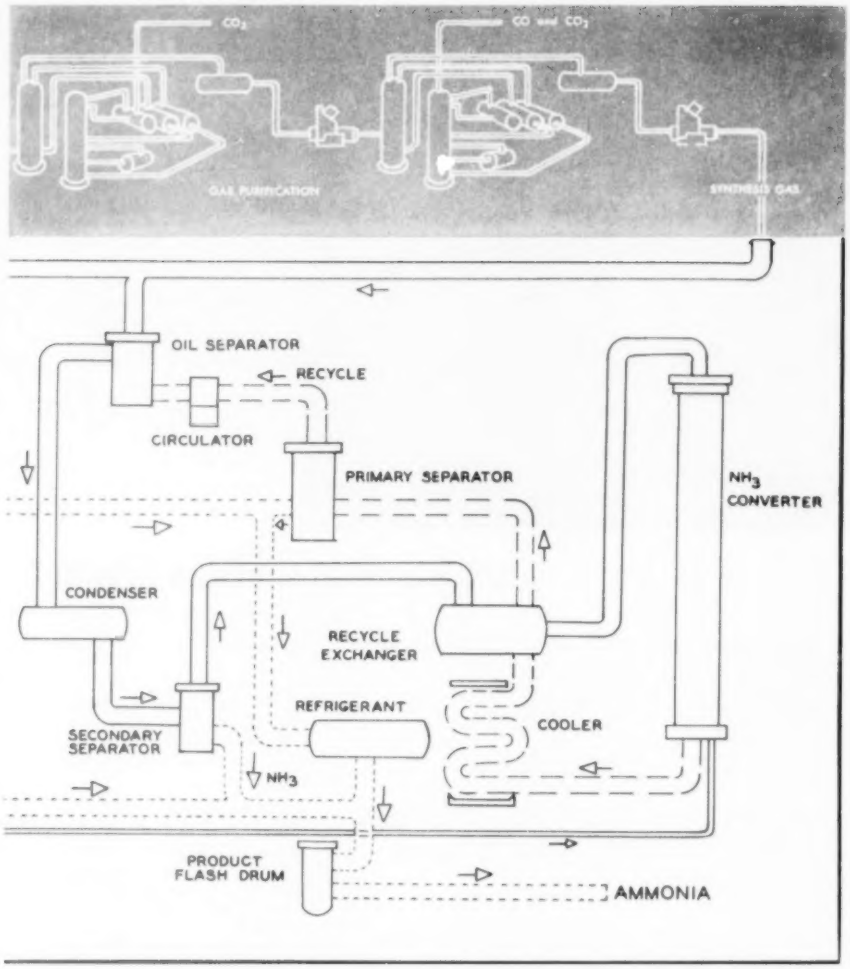
● MORE AMMONIA . . .

Eight new ammonia plants or expansions, based on hydrogen from natural gas, have been scheduled for completion in 1954. (One of these, Spencer Chemical Co.'s Vicksburg works, went on stream as this was being written.) A ninth new project, actually under construction and employing partial oxidation, will most likely use natural gas, although it is rumored that this plant might go to residual fuel oil as feed stock for making hydrogen. A tenth plant, that of Atlantic Refining Co. in the Philadelphia area, using refinery byproduct hydrogen (from catalytic reforming) is now nearing completion. An eleventh project, the National Distillers Products Corp. plant at Tuscola, Ill., to be completed probably in early 1955, will employ byproduct hydrogen from its ethylene plant. A twelfth project, based on natural gas and due for completion in late 1955, has been announced by Salt Lake Chemical Co.

Steam-methane . . . In at least two plants which came into production in late 1953, synthesis gas is prepared by a modification of the wartime "conventional" steam-methane reforming. In these plants the catalytic steam-methane process is conducted at elevated pressure such that savings in compression can be expected.

Partial oxidation . . . On the other hand, in five of the new plants, design calls for the production of ammonia synthesis gas at still higher pressure by the noncatalytic partial oxidation with oxygen in Texaco Development Corp. gas generation units. The first of these plants, that of Spencer Chemical at Vicksburg, is already on stream *(The Oil and Gas Journal, February 8, 1954, page 60)*. The Vicksburg operation will be discussed in an article to follow in this series.

Partial oxidation, developed by the Texaco Development Corp. and Hydrocarbon Research, Inc., is perhaps the one engineering innovation in the ammonia expansion program being followed most keenly by the whole petrochemical industry. As noted in the Journal news article just cited, dealing with Spencer's Vicksburg plant, partial oxidation offers some potentialities both



used to prepare synthesis gas. Point-by-point temperature control is approached in converter.

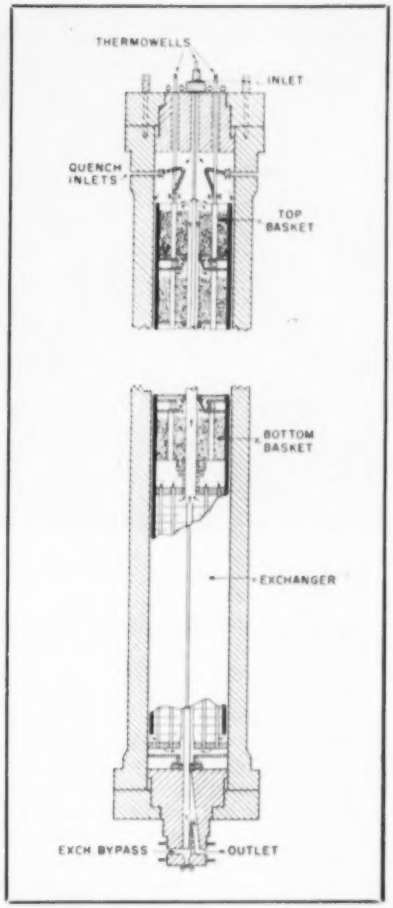


Fig. 2—CONVERTER—The Kellogg converter provides for cooling of gases between catalyst layers.

with regard to feed stocks and products. Flexibility to use either natural gas or heavy oil fractions as feed stocks and further flexibility to make ammonia, methanol, acetylene, or other petrochemicals are some possibilities of interest in connection with the partial-oxidation method.

In ammonia manufacture, tonnage air-separation units are associated with the partial-oxidation method. In addition to furnishing the oxygen for the partial combustion, these units also provide high-purity nitrogen for nitrogen wash in synthesis-gas purification as well as process nitrogen required for final adjustment to the three-to-one mole ratio of hydrogen to nitrogen necessary for ammonia conversion.

Making urea . . . Manufacture of urea also figures prominently in the process schemes of some of the new plants. Production of urea (45 per cent nitrogen) is not new in the United States but its manufacture here by processes such as the Montecatini and the Pechiney is new. The Montecatini process, to be described briefly in this article, is now made available in the United States by M. W. Kellogg Co. The Pechiney process has been incorporated into a nitrogen products process scheme designed and licensed by Foster Wheeler Corp. and including partial oxidation for synthesis-gas preparation and the high-pressure (800 atm. or higher) Casale process for ammonia synthesis. This process will also be described in a later article.

The interest in urea manufacture reflects the trend in the United States for application of nitrogen fertilizer materials with increasingly greater nitrogen content. Currently, use of ammonium nitrate (33 per cent N) has gone ahead of ammonium sulfate (21 per cent N). Application of anhydrous ammonia in irrigation waters or by direct injection into the soil was also expected to continue rising[1] for the fertilizer year 1953-54.

Ammonia construction . . . A quick look at the current picture for ammonia is given in Table 1. Projection of expenditures for new capacity listed indicates that some $170,000,000 is being spent in current construction with capacity to be added of over 700,000 tons per year of NH_3. If one includes projects completed in 1953 as listed in Table 1, then total expenditures for ammonia-plant construction for 1953-54 total to about $250,000,000, representing new capacity of well over 1,000,000 tons per year of ammonia based on natural gas or petroleum-derived byproduct hydrogen.

The construction now in progress is part of a nitrogen expansion program continuing from about 1951. The program provided for addition of some 1,300,000 short tons per year of synthetic nitrogen by 1955. Estimates are that with completion of this program synthetic ammonia capacity in the United States will be in the order of 3,500,000 short tons per year. This represents well over 90 per cent of total nitrogen production. In turn, a good three-quarters of the synthetic

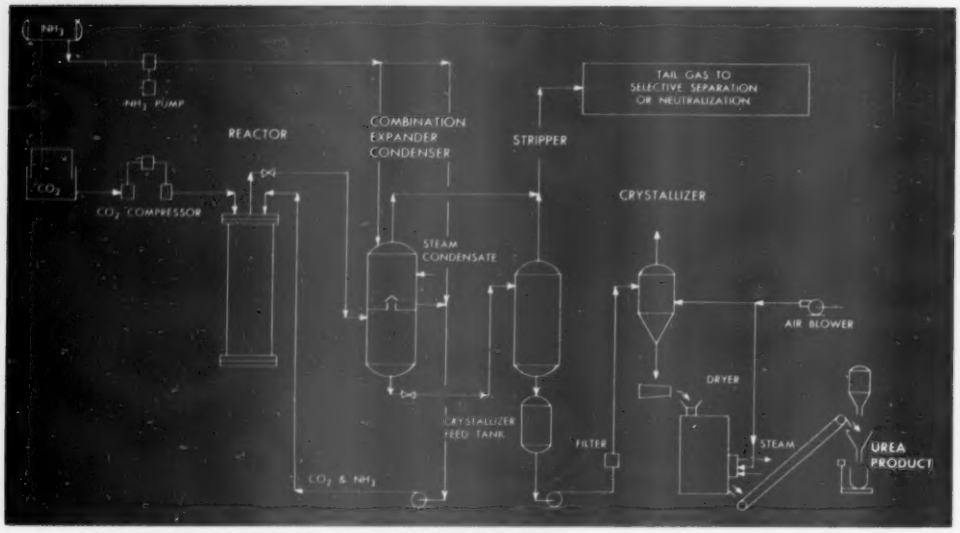


Fig. 3—Montecatini urea method employs partial recycle. It is stated that "the design of the (expander-condenser) vessel . . . enables the recovery of nearly 75 per cent of the unconverted ammonia and CO_2 as a liquid," resulting in relatively smaller compression load.

ammonia would utilize hydrogen made from natural gas.[2,3]

● SOME ENGINEERING INNOVATIONS . . .

For making synthesis gas, steam-methane reforming has been employed normally. Reaction between steam and hydrocarbons can be conducted in the temperature range between 1,200° and 2,000° F. and at atmospheric pressure (gas reform units of wartime design operate at a pressure of about 12-16 in. of water). Steam-methane reforming is used by the two latest ammonia plants to come into production before completion of Spencer Chemical's Vicksburg plant, but these operate their reform units at pressures above atmospheric. The plants in question are those of Phillips Chemical Co. in the Houston area and the Shell Chemical Co. works at Ventura, Calif.

At the Phillips plant the process stream enters secondary reforming at a pressure of about 25 psig. Shell reports[3] that at its Ventura plant, which was designed and built by M. W. Kellogg Co., steam-methane reforming is carried out at elevated pressure. Kellogg also designed and built the original ammonia units operated by Commercial Solvents Corp. at Sterlington, La., and by Mathieson Chemical Corp. at Lake Charles, La., and is presently engaged in design and construction of the ammonia section for National Distillers Products Corp. at Tuscola, Ill.

Reform under pressure . . . The main steps in the Kellogg ammonia process are indicated in the simplified flow diagram of Fig. 1. One of the important features of this design is that the reforming section can be operated at pressures of about 100 psi. From its studies in a semicommercial plant, Kel-

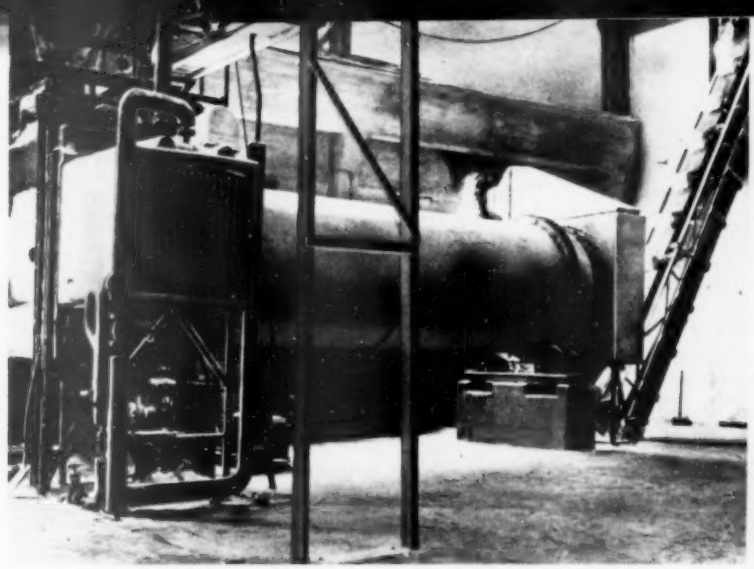
Table 1—Ammonia Plant

(Based on natural gas or

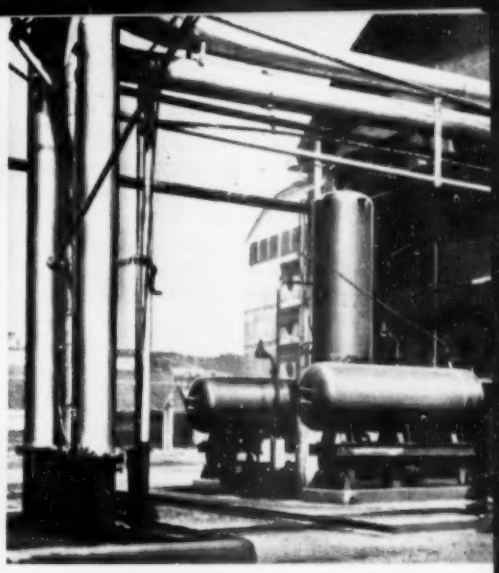
Company and location—	Cost	Completion date	Ammonia capacity, products
Allied Chem. & Dye Corp., Nitrogen Div.:			
Hopewell, Va.	$8,000,000	Conversion to natural gas completed in 1953	Capacity increased by nearly 20 per cent; now 150 tons per day
La Platte, Neb.	26,800,000	May 1954	200 tons per day ammonia and urea
South Point, Ohio		Comp. 1953	150 tons per day
American Cyanamid Co.:			
Avondale, La.	50,000,000	Spring 1954	Ammonia, ammonium sulfate; total expenditure includes facilities for making acetylene, hydrocyanic acid, acrylonitrile and sulfuric acid. Ammonia capacity being doubled to over 300 tons per day
Atlantic Refining Co.:			
Point Breeze, Pa.		Early 1954	100 tons per day ammonia (by-product hydrogen from cat-former)
Brea Chemicals, Inc. (Union Oil Co.):			
Brea, Calif.	13,000,000	Summer 1954	200 tons per day ammonia
Commercial Solvents Corp.:			
Sterlington, La.	20,000,000	In operation 1953	Expansion; doubled capacity for ammonia, methanol; ammonia production increased by 190 tons per day; plant also makes ammonium nitrate, nitrogen solutions
Cooperative Farm Chémicals Corp.:			
Lawrence, Kans.	16,000,000	Estimated 1954	150 tons per day ammonia, urea; partial oxidation (Texaco Development Co.)
Deere & Co., Grand River Chemical Div.:			
Pryor, Okla.	18,000,000	May 1954	180 tons per day ammonia, 270 tons per day urea; partial oxidation (Texaco), Casale-Pechiney
Grace Chemical Co. (W. H. Grace & Co.):			
Woodstock, Tenn.	19,000,000	Spring or Summer 1954	250 tons per day ammonia, urea; partial oxidation (Texaco), Casale-Pechiney

Under consideration—Chillicothe Chemical Co. at Chillicothe, Tex., 180 tons per day ammonia. Pacific Chemical Co. at Pasco, Wash., 100 tons per day. Utah Chemical Co. at Nephi, Utah, 270 tons per day. All of these based on natural gas.

Under consideration—Northern Chemical Industries at Sears Port, Me., 150 tons per day. Based on crude oil or possibly residual fuel oil.



ROTARY DRIER employed to remove moisture from urea crystals.



AMMONIA WEIGH TANKS measure fresh NH_3 going to urea manufacture.

Construction, 1953–1954

petroleum byproduct hydrogen)

Company and location—	Cost	Completion date	Ammonia capacity, products
Lion Oil Co.:			
Luling, La.	$31,000,000	Second quarter 1954	300 tons per day ammonia, 430 tons per day nitric acid; 550 tons per day ammonium nitrate and 50 tons per day anhydrous ammonia to be marketed
Mississippi Chemical Corp.:			
Yazoo City, Miss.	2,000,000	Expansion completed in 1953	Additional 60 tons per day
National Distillers Products Corp. (U. S. Industrial Chemicals Co.):			
Tuscola, Ill.	7,000,000	January 1955	140 tons per day ammonia; ammonium nitrate, nitrogen solution, nitric acid. (Byproduct hydrogen from ethylene unit)
Phillips Chemical Co.:			
Pasadena, Tex.	34,200,000	Plant in operation, 1953	450 tons per day anhydrous ammonia
Pasadena, Tex.	5,500,000		Expansion, ammonium sulfate facilities (expenditure also includes triple superphosphate plant)
Salt Lake Chemical Co.:			
Salt Lake City, Utah		Third quarter 1955	120 tons per day; 30 tons per day dry ice; partial oxidation—Claude
San Jacinto Chemical Corp. (Smith-Douglass Co., Inc.):			
Houston, Tex.	1,400,000	Early 1954	Expansion, adding 40 tons per day anhydrous ammonia
Shell Chemical Co.:			
Ventura, Calif.	10,000,000	Plant in operation	150 tons per day anhydrous ammonia
Spencer Chemical Co.:			
Vicksburg, Miss.	15,000,000	On stream, February 1954	200 tons per day ammonia, 100 tons per day nitric acid; anhydrous ammonia, ammonium nitrate, nitrogen solutions. (First plant using Texaco partial oxidation)

In progress—Hooker Chemical Co. at Tacoma, Wash., adding 20 tons per day, completed 1954. Pennsylvania Salt Co. completed expansion in 1953, adding 55 tons per day. Mathieson at Lake Charles, La., installed 60 tons per day in 1953. All of these based on byproduct hydrogen from chlorine cells.

Under consideration—Columbia-Southern Chemical Co. at Natrium, W. Va., 100 tons per day. Based on byproduct hydrogen from chlorine cells.

logg concluded that operation with the higher-pressure reformer would lead to savings of some 25 to 35 per cent in compressor horsepower. Advantage can therefore be taken of the above-atmospheric pressure at which the natural gas feed is ordinarily supplied.

Kellogg converter . . . The other important feature of the Kellogg process is the use of an ammonia converter in which ideal isothermal operation or point-by-point temperature control is approached. This is accomplished by employing layers of catalyst with efficient cooling of gases between the layers. This design, Kellogg states, leads to longer catalyst life, lower maintenance cost and higher conversion per pass. Summary of economics for Kellogg's ammonia process for natural gas, hydrogen gas and hydrogen-rich gas feeds and for different plant capacities is given in Table 2.

Montecatini urea . . . Kellogg is also licensor in the United States of the Montecatini process for making urea. This process features an expansion condenser designed to recover nearly 75 per cent of the unreacted ammonia and carbon dioxide, which are recycled as a solution in fresh ammonia and steam condensate. It is stated that this leads to substantially reduced compressor requirements as compared to other partial recycle processes. Corrosion problems are also said to be greatly reduced due to the excess ammonia in the recycle stream.

● MAKING SYNTHESIS GAS . . .

The steam-methane reforming process includes these steps: (1) primary reforming, (2) secondary reforming, and (3) shift conversion. The first step, endothermic reactions between the com-

ponents of the natural gas and steam, take place in the reforming furnace. For methane the reforming reactions may be represented as:

$$CH_4 + H_2O \rightarrow CO + 3H_2 \quad (1)$$

$$CH_4 + 2H_2O \rightarrow CO_2 + 4H_2 \quad (2)$$

These reactions are ordinarily conducted at temperatures between 1,400° and 1,500° F. While various furnace designs can and have been used, a typical operation would be one in which the reactions take place in alloy tubes packed with nickel catalyst and arranged vertically in the furnace. About 70 per cent of the natural gas is converted in this first step.

In the secondary reforming the mixture of hydrogen, carbon monoxide, and carbon dioxide is burned with air in the combustion chamber. Air is injected in the quantity necessary to provide the stoichiometric amount of nitrogen for the ammonia synthesis. The combustion takes place, again over nickel catalyst, to reform the remainder of the natural gas. The heat of combustion raises the temperature to 1,700°-1,800° F. Oxygen is completely reacted and the methane is nearly completely consumed.

The gas stream is now cooled to 700°-750° F. In the Kellogg process the stream is cooled by entering a quench vessel following the combustion chamber. Cooling in this manner by direct water quench rather than by heat exchange in a waste-heat boiler provides the steam required in the water-gas shift conversion. In the shift reactor the gas passes with the steam over iron oxide catalyst to convert some 90-95 per cent of the CO to CO_2 with production of additional hydrogen in a slightly exothermic reversible reaction:

$$CO + H_2O \leftrightarrows CO_2 + H_2 \quad (3)$$

A synthesis gas is obtained containing 60 mole per cent H_2, about 16 per cent CO_2, several per cent CO, small amounts (under 1 per cent) of oxygen, methane, and argon, and the remainder (20 per cent) of nitrogen. The theoretical molal ratio of three hydrogens to one nitrogen desired for ammonia synthesis has thus been obtained by addition of air and combustion of the oxygen in the secondary reform step. This is in contrast with the method of introducing highly pure nitrogen from an air-separation unit, following removal of the CO_2, as noted for process schemes employing partial oxidation.

TABLE 2—ECONOMICS OF KELLOGG AMMONIA PROCESS FOR VARIOUS FEEDS AND CAPACITIES

CHARGE STOCK—VOLUME PER CENT

	Natural gas	Hydrogen gas	Hydrogen rich gas
M.s.c.f. per ton NH_3	21.7	69.1	83.8
H_2		98.00	87.5
N_2	0.4	1.56	
O_2	0.1	0.42	
Ar		0.02	
CH_4	94.2		6.3
CO_2	0.4		
C_2H_6	4.2		3.9
C_3H_8	0.7		2.2
C_4H_{10}			0.1
Total	100.0	100.0	100.0
Air, M.s.c.f. per ton NH_3	31.3	30.0	55.5

CATALYST—POUNDS PER TON NH_3

Reforming	0.22		
Shift	0.38		
Synthesis	0.11	0.11	0.11

CHEMICALS—POUNDS PER TON NH_3

M.E.A.	0.56		
Copper	0.20		
Acetic acid	0.30		
Ammonia	0.20		
NaOH		2.0	2.0

UTILITIES

	(1)	(2)	(3)	(4)
Steam—220 psig., lb. per ton NH_3	6,570		900	900
Cooling water, 80° F., M. gal. per ton NH_3	99	35	45	64
Boiler feed water, gal. per ton NH_3	187			
Electric power, kw.-hr. per ton NH_3	50	928	978	19
Fuel gas, M.M. B.t.u. per ton NH_3	18			8.5

ERECTED PLANT COST

Capacity, per day:				
60 tons	$4,020,000	$2,200,000	$2,330,000	$2,660,000
100 tons	5,200,000	3,000,000	3,100,000	3,510,000
150 tons	6,650,000	3,800,000	3,940,000	4,480,000

(1) Compressors—Gas-engine drives—except steam circulator. (2) Compressors—All-electric drives—including circulator. (3) Compressors—Electric drives—except steam circulator. (4) Compressors—Gas-engine drives—except steam circulator and electric turbo-air compressor.

TABLE 3—MONTECATINI PARTIAL RECYCLE PROCESS FOR UREA

MATERIAL BALANCE
(Tons per 100 tons urea product)

Ammonia:	
Fresh feed	82.0
To urea reaction	*56.7
Loss	0.3
To neutralization	25.0
Carbon dioxide:	
Fresh feed	73.7
To urea reaction	*73.3
Loss	0.4

PRODUCT QUALITY
(Weight per cent)

Nitrogen	46.3
Water content	0.5
Free NH_3	0.02
Ash	0.003
Biuret	0.01
Aqueous solution of 5 per cent urea	Clear and colorless

*Combined urea reaction figures include water produced in reaction—approximately 30 tons.

● PURIFYING SYNTHESIS GAS . . .

Purification of the crude synthesis gas is an extremely critical step in ammonia manufacture in that impurities must be reduced to 20,000,000 p.p.m. or even to as low as 10,000,000 p.p.m. depending on the conversion pressure and temperature, the extent of conversion, and catalyst life desired. Purification is carried out between stages of compression. Removal of the carbon oxides is of primary importance in order to minimize ammonia catalyst poisoning and prevent formation of ammonium carbonates and carbamates in the conversion section equipment and process lines.

Removal of methane and other inerts may be desirable to reduce their build-up in the ammonia synthesis recycle, thus reducing the purge of inerts with its attendant ammonia and synthesis-gas loss. Sulfur compounds must be removed since these may be reform catalyst poisons. Generally, sulfur is of little concern where natural-gas feed

stock is used. Should there be some sulfur content in the feed it would be converted to H_2S and removed with the CO_2 in the M.E.A. contacting. It is also important to remove water vapor from the synthesis gas to minimize operating difficulties such as breakage of valves and springs and icing of exchangers. Water vapor is also bad for the synthesis catalyst and last traces of it must be removed before entering the synthesis section.

CO_2 removal . . . This can be done by scrubbing with water or by contacting with M.E.A. (monoethanolamine) as in the Girbotol process. Absorption of CO_2 in water is such that operation of the water-scrubbing method is not practical below 200 psig. On the other hand, M.E.A. absorption can be conducted at pressures ranging from nearly atmospheric (say about 10 psig.) to over 200 psig. The advantage of going to higher pressure is, of course, in reduced size of equipment. The new Shell Ventura plant, for example, employs M.E.A. absorption at 200 psig. A combination of water absorption and M.E.A. treating may be used on occasion. At the Pittsburg, Kans., plant of Spencer Chemical Co., pure CO_2 was required for the methanol and dry-ice operations, therefore M.E.A. units replaced some of the original water-absorption towers in the plant,[4] so that this plant operates with a combination of water and M.E.A. absorption.

The M.E.A. system operates with cyclic regeneration of the rich amine solution leaving the bottom of the contacting tower. This solution is let down in pressure and exchanges heat with hot lean solution leaving the reactivator or stripping column. In this latter column the CO_2 is stripped out with steam. Reboil heat is supplied to the stripper. The lean solution is then returned to the top of the absorption tower. A slipstream of this solution is removed to a vacuum unit for purification.

Advantages of M.E.A. treating as compared with water scrubbing are: (1) practically no synthesis-gas loss due to the much lower solubility of the synthesis gas in the M.E.A. solution; (2) highly pure CO_2 is obtained on regeneration of the M.E.A., an important factor if urea, methanol or dry ice are to be made; (3) reduction of CO_2 down to between 0.5 and 0.2 or even down to 0.1 per cent as compared to 1 per cent or higher with water absorption; (4) compactness of equipment, and (5) no oxygen contamination.

CO removal . . . The common method for removal of CO is by absorption with copper ammonium formate or acetate solution, referred to as "copper liquor." Copper liquor treating is done at higher compressor interstage, at 1,800-2,000 psig. and the liquor is refrigerated. It is a somewhat more complex operation than the M.E.A. treating and requires more auxiliary equipment and careful chemical control. Due to the low absorptivity of the copper solution for CO, high pressure and low temperature are required.

In copper ammonium treating the contacting tower operates in conjunction with a regenerator tower, and the equipment usually includes a caustic absorber and water and ammonia solution coolers. Following absorption at 1,800 psig. with copper ammonium formate cooled down to about 40° F., the synthesis gas goes through the caustic scrub and is returned to higher stages of compression in preparation for ammonia synthesis.

Copper liquor leaving the bottom of the contactor goes to the top of the regenerator. The latter vessel consists of three sections: (1) a packed reflux section, (2) a center stripping section, and (3) a bottom oxidizer section. The center and bottom sections are steam heated. The center section is equipped with calandria tubes (steam on outside of tubes) while the oxidizer section is equipped with a steam bundle (steam inside of tubes).

In the packed top section the complex molecule of CO and cuprous ammonium formate is dissociated with release of the CO which is vented to the atmosphere. Ammonia, liberated from the middle section is reabsorbed here in the refrigerated solution flowing downward. The solution flows to the bottom section through an outside line. In the bottom section oxidation of cuprous to cupric ion takes place through controlled addition of air. Makeup ammonia is also added here.

As the solution flows up through the tubes in the center section, the remainder of the CO is stripped as well as the ammonia, the latter being reabsorbed in the reflux section. Stripped liquor overflows the center-section tubes and leaves the regenerator via a concentric annular section and over a weir, then through water and ammonia coolers, back to the top of the formate absorber.

Methanation . . . Residual CO may be removed by methanation which is accomplished by passing the synthesis gas through a guard converter quite similar to the ammonia converter. The CO is converted principally to methane and water. Inerts such as methane, argon, etc., accumulate in the synthesis recycle gas so that the synthesis loop must be purged, although part of the methane may be dissolved in the liquid ammonia produced. Generally speaking, methanation is employed with the higher-pressure ammonia processes.

Nitrogen wash . . . Methanation is then open to the objection that it not only fails to remove methane but actually adds to the methane content. This is overcome through use of the nitrogen wash[5] which works in quite well with processes employing partial oxidation. Highly pure (99-plus per cent) nitrogen is available for this purpose from the air-separation plant. The nitrogen wash removes residual CO, argon, oxygen methane, and possibly other hydrocarbons present in very small quantities, thus contributing to long catalyst life and high conversion. At the Spencer Vicksburg plant a guard converter is in the process along with a nitrogen wash tower.

● AMMONIA SYNTHESIS . . .

Returning to the flow diagram of Fig. 1, the pure hydrogen goes through oil separators where it is mixed with the recycle from the synthesis loop. In the secondary separator liquid ammonia carried by the recycle is knocked out. Ammonia synthesis gas then goes through heat exchange and is charged to the catalytic reactors. Product from converters goes first through water cooling and is heat-exchanged with the feed stream going to the converters in the recycle gas exchangers. Anhydrous liquid ammonia is taken out in the primary separator, is further cooled to 25° F. by refrigeration, and goes out through the anhydrous ammonia product flash drum.

Synthesis reaction . . . The combination of three moles of hydrogen with one of nitrogen to yield two moles of ammonia proceeds with evolution of some 26,000 calories of heat. This means that low temperature will favor ammonia formation. In practice, however, a relatively high temperature, ordinarily in the range of 900°-950° F. is employed, since at lower temperature the speed of reaction is too slow.

The mole per cent of ammonia in equilibrium with the stoichiometric amount of hydrogen and nitrogen increases with the increasing pressure due to the volume change in the reaction. The pressure employed, however, varies in commercial practice from somewhat over 1,500 psi. to as high as 15,000 psi. Purity of the synthesis gas requires consideration when selecting the operating pressure. If deactivation of the catalyst could be minimized and if a more efficient catalyst were used, for

(Continued on page 109)

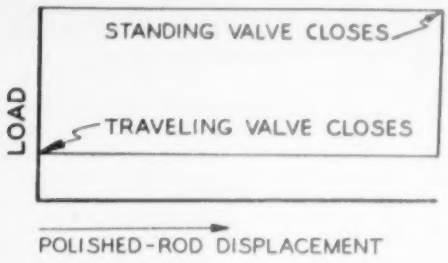


Fig. 1

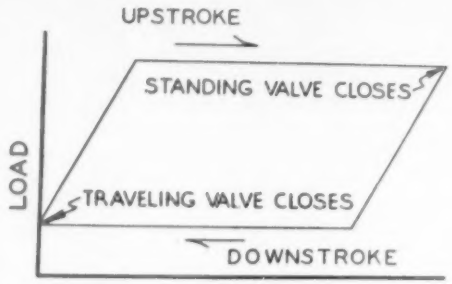


Fig. 2

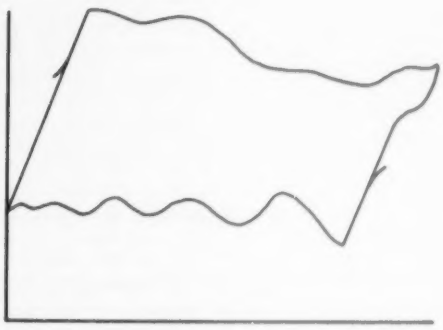


Fig. 3

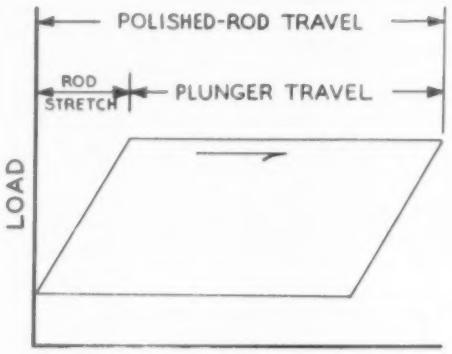


Fig. 4

What Will Dynamometer Cards Tell You?—2

Factors Influencing Pumping-Well Loads

by Emory N. Kemler

SUCKER-ROD problems are complicated by there being many, rather than only a few, factors which can influence the loads and motions. As the previous installment in this series dealt with the dynamometer's use in measuring the pumping loads, it is now possible to identify many well troubles through interpretation of the dynamometer cards.

While **complete** analysis of individual dynamometer cards is normally impossible because of the conflicting actions taking place, it is often possible to identify many actions from the shape of the cards. However, when many factors are combined in a card, the individual effects of a given particular factor may be masked by some other factor.

Even though any one particular effect may not show up, many others may, hence some idea as to what is taking place may be evident. While there may be many definitions as to the ideal card, it is usually considered to be that card which transmits the required horsepower with the lowest maximum load. The card to meet this requirement, shown in Fig. 1, is not even closely approximated in a conventional well.

Author is professor of mechanical engineering, University of Minnesota.

Perhaps such a card could be realized if, (1) there was no rod stretch, (2) there were no inertia effects, (3) there was no friction, (4) there were no vibrations, and (5) there was no time lag in transmission of motion. Except for friction the card would represent action at an **exceedingly long stroke** and **slow pumping speed.**

While this type card can only be approximated by extremely slow speeds with conventional equipment, there are perhaps other approaches to achieve it. Most attention to the pumping problem has been directed to the sucker rods, and little attention has been given to the influence of the polished-rod motion. With conventional equipment, there is little that can be done to modify the motion without radical changes in the pumping-unit mechanisms. However, the use of hydraulic and pneumatic cylinders for actuating the polished rod has resulted in a radically modified pumping motion.

Sucker-rod stretch . . . Rod stretch is one of the easier effects to calculate, as it enters into the problem both on the upstroke and downstroke. When there is an increase of load on any elastic member, there is an accompanying change of length. For most systems the change of length is small, but in the sucker-rod system the length is sufficient to make the stretch a significant percentage of the stroke.

When the plunger starts on the upstroke, the traveling valve closes and the plunger starts to pick up the fluid load. However, it cannot pick up this load at once, because when the fluid load is applied to the plunger, the sucker rods stretch. Thereby, part of the load sets down on the tubing again. Actually, this transfer of load from the tubing to sucker rods will be gradual. Before the rods can pick up the

Too many soups spoil the cook

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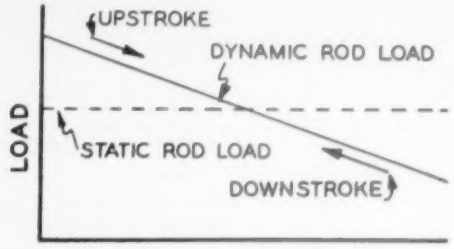


Fig. 5

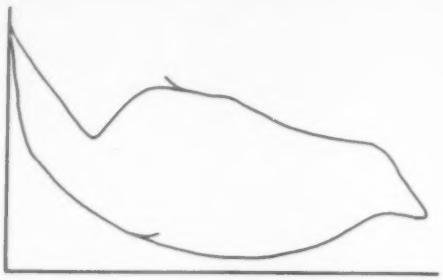


Fig. 6

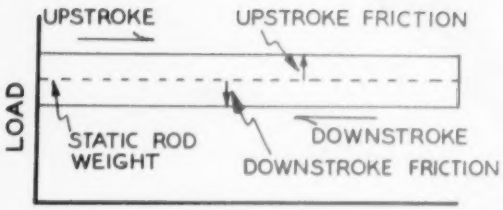


Fig. 7

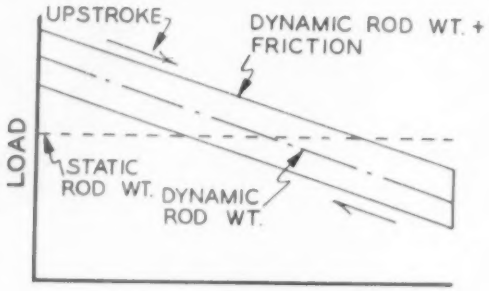


Fig. 8

total fluid load, the polished rod will have to move a distance equal to the rod stretch plus the amount the tubing contracts when fluid load is picked up.

Fig. 2 is an idealized card showing how rod stretch influences the shape of the card; the inertia, friction, and other effects have been omitted and only the rod stretch shown. At the start of the upstroke the traveling valve closes as shown, and the sloping line shows schematically how the rod load increases and how much time is required to pick up the fluid load. At the end of the stroke the standing valve closes and the fluid load is gradually transferred back to the tubing.

The sucker-rod stretch in inches will be given by:

$$e = \frac{12\,(\Delta P)\,D}{A_r E} \qquad (1)$$

where:

ΔP = change in load, lb.
e = stretch caused by change in load ΔP, in.
D = depth to pump, ft.
A_r = rod area, sq. in.
$E = 30 \times 60^6$, psi.

As a close approximation in the absence of other information, the change in load can be estimated as equal to the difference in fluid pressure across the plunger times the plunger area. When there is no effective fluid head in the casing:

ΔP is approx. equal to A_p (D) 0.433 s

$$= 0.34\ D\ d^2\ s \qquad (2)$$

where:

A_p = plunger area, sq. in.
D = depth to pump, ft.
s = specific gravity of fluid
d = plunger diameter, in.

As an example, consider a case where ΔP = 5,000 lb., D = 6,000 ft., and A_r = 0.785 sq. in. From Equation 1:

$$e = \frac{12\,(5{,}000)\,6{,}000}{0.785\,(30 \times 10^6)} = 15.3 \text{ in.}$$

This is an appreciable amount of stretch for a 1-in. rod string, and to it should be added the tubing stretch. The tubing stretch can be calculated from Equation 1 if instead of rod area, cross-sectional area of the tubing is used. Since the tubing area is much larger than the rod area, it generally does not amount to more than 20 per cent of the rod stretch.

Stretch on the card . . . Fig. 3 shows a card from a long-stroke unit at reasonable pumping speed on which the rod stretch influences are quite pronounced. In general, the stretch factor shows up as an increasing load just after the traveling valve closes and a decreasing load just after the standing valve closes.

Rod stretch has a direct influence on the effective plunger travel. If the ΔP or difference in load between traveling valve closing and standing valve closing is positive, the actual plunger stroke will probably be less than the polished-rod stroke. If, however, the load at the time of the traveling valve closing is larger (ΔP is negative), the plunger will overtravel.

These statements must be qualified somewhat since the difference in loads must also consider the phase relations between top and bottom motion and loads. However, as a first order estimate, the above method can be used. In the examples shown in Figs. 2 and 3, the plunger stroke will be less than the polished-rod stroke. Again, with the same qualifications, the plunger stroke will be as indicated in Fig. 4. For a case which considers other factors than just rod stretch, the stroke cannot be so easily determined and must be calculated by using the change-of-load method.

Inertia effects . . . The inertia or acceleration factor is moderate for normal pumping speeds. The general nature of inertia effects is best illustrated by considering the sucker-rod string only, so that if we consider simple harmonic motion for the polished rod, the maximum acceleration will be:

$$A_{max.} = \frac{I\,N^2}{2{,}180} \qquad (3)$$

where:

$A_{max.}$ = acceleration, ft. per sec. per sec.

L = stroke length, in.

N = pumping speed, s.p.m.

For a well pumping at twenty 60-in. s.p.m.

$$A_{max.} = \frac{60\,(20)^2}{2{,}180} = 11 \text{ ft. per sec. per sec.}$$

The maximum load of the rod system only will be:

$$W_{max.} = W_r + (W_r/g)\, A_{max.}$$

where:

W_r = rod weight, lb.

g = 32.2 ft. per sec. per sec.

$$W_{max.} = W_r\,(1 + A_{max.}/g)$$
$$= W_r\,(1 + LN^2/70{,}500)$$

For the above example:

$$W_{max.} = W_r\,(1 + 11/32.2)$$
$$= W_r\,(1 + 0.33)$$

The dynamic effect will, under these conditions, amount to 33 per cent of the static load. It increases the load at the start of the upstroke and decreases it an equal amount at the top of the stroke. This assumes that the rod string moves as a single mass. Since the rod weight is distributed and because of lag it will not be this large.

It is of particular interest to note that the acceleration factor if applied in a conventional manner, would exert its maximum influence at the start and end of the pumping stroke. If the acceleration were the predominant factor in determining rod loads we would expect to find the peak load at the start of the upstroke and the minimum load at the bottom of the upstroke. This condition does not normally exist because the more influential factors on shape of the card in addition to valve action are rod stretch, and time lag in transmission of motion.

With rod load only Fig. 5 shows the shape of an idealized dynamometer card for rods only. Consequently, the maximum load occurs at the start of the upstroke and the minimum at the top of the stroke. As in all simple harmonic motions the acceleration is zero when the velocity is a maximum, (middle of the stroke), and maximum when the displacement is zero or maximum, (ends of the stroke).

When the pumping speeds are high, the dynamic effects become more pronounced and their influence more prominent. Fig. 6 is a high-speed card corresponding to potential pumping as once practiced in western Kansas. As maximum acceleration here was of the order of the magnitude of gravity, frequently zero dynamometer loads were registered on the downstroke and corresponding high loads occurred at the start of the upstroke.

For the card in Fig. 6, the acceleration effects become important. For slow pumping as illustrated by the card in Fig. 3, the fundamental inertia effects are small. In the nominal pumping card, the maximum load occurs at, or near, the middle of the stroke where the acceleration is zero or very small.

There are two general conclusions which can be reached from the foregoing discussion. First is that at normal pumping speeds the acceleration factors are not as contributory to high rod loads as is generally believed. Second is that the slope of the dynamic load of a simple system as indicated is the same on the up and down strokes.

Since the card for rods only has no area, there is no work done, and inertia effects, therefore, have no influence on horsepower requirements. They do influence loads, although somewhat differently and less critically than normally considered.

Friction . . . The effect of friction in the system is difficult to evaluate; but basically, friction will increase the loads on the upstroke and decrease the loads on the downstroke. This tends to increase the area of the dynamometer card. Fig. 7 indicates the effect of friction with a rod string only with no other factors considered. Fig. 8 shows essentially the same thing as Fig. 7, only that both friction and dynamic loads are considered.

The introduction of friction results in the card having an area, and as this area represents work, the basic effect of friction is to increase the power requirements. Friction is also seen to increase the upstroke loads and to decrease the downstroke loads. These effects are what give area to the cards.

Under a few conditions where the stuffing box is not properly aligned or tightened excessively, this friction might be sizable but is normally small compared with other factors in the system. Under some conditions, particularly in crooked holes, sucker-rod friction might be high. The lateral forces which are developed in going around a bend or a crook in the hole might be high, resulting in high friction. In this case, wear would probably be excessive on the sucker-rod couplings and tubing.

Pump friction has in some cases been appreciable. In a well of the order of 6,000 ft. deep, the dynamic fluid pressure at the start of the upstroke may be larger than 3,000 psi. In any conventional sealing device used with such pressures the friction is considerable.

On the upstroke the fluid friction will be a factor but, because of the normally low velocity in the tubing string, is usually negligible.

The general lack of information on friction makes it difficult to evaluate the influence it has on the dynamometer card. The generally low subsurface efficiency of many pumping wells indicates that friction is a larger factor than normally considered. Although the presence of plunger leakage will not show up on the normal dynamometer card, it will, however, reduce the subsurface efficiency.

Phase lag . . . One of the more important, and certainly the most difficult, factor to explain is the time delay in the transmission of the polished-rod

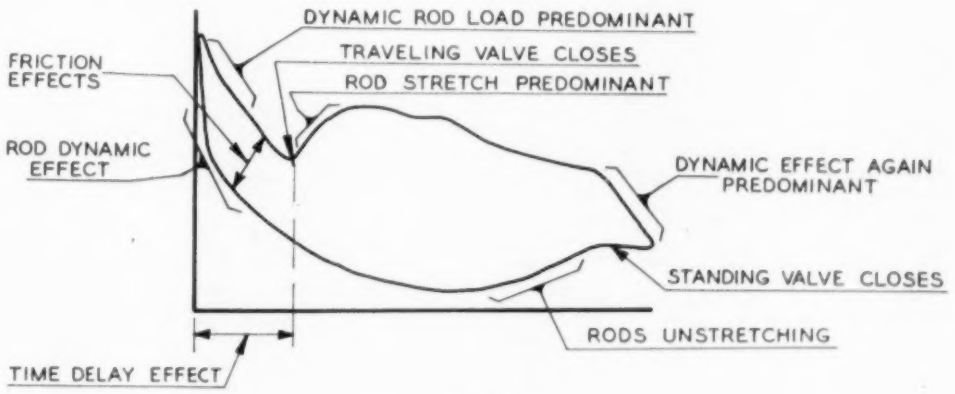


Fig. 9

motion. We are all familiar with the fact that we can see the smoke from a gun or the steam from a train whistle long before the report is heard. We know from experiment that the velocity of the sound wave is about 1,000 ft. per second in air, so that the report of a gun flash a mile away would not be heard for about 5 seconds.

A similar phenomenon occurs in the transmission of the polished-rod motion to the plunger and fluid. The velocity of travel of the stress wave through steel is, however, at about 16,000 ft. per second and in oil about 4,000 ft. per second.

In normal types of mechanical systems these time factors are negligible since the lengths are small compared with the velocity. In deep wells, however, the time-lag factor becomes an appreciable part of a pumping cycle and must be taken into account.

In a 4,000-ft. well, starting from rest the time for the motion to be transmitted to the plunger would be ¼ second and for the plunger response to reach the polished rod another ¼ second. This represents an appreciable portion of the stroke of a well making 20 s.p.m. or 3 seconds per cycle.

The study of this problem is complicated by the fact that once the system gets into operation the polished rod and plunger may operate with only a slight phase lag. In such a case, the motions would be essentially identical, but there would still be the delay in transmitting the force to the polished rod.

Since the system is influenced by the complex valve action, any elementary study represents only a rough approximation. Only through the use of a computer or analog is it possible to completely study this problem.

Measuring lag . . . If a simple mass system without damping operates below its natural frequency the motion of the mass will be identical with the forcing function. Even with damping there is little phase lag when the frequency is small relative to the natural frequency.

Since the natural frequency of the sucker-rod system is normally over twice the pumping speed, we can in most cases safely assume that when the system has been in operation for a few strokes, the plunger and polished-rod motions are nearly in phase. This means that the only lag will be that of transmitting the load or signal from the plunger to the polished rod.

When the traveling valve closes and starts to pick up the load it will then require a time

$$t = \frac{\text{Well depth}}{16{,}000} = \frac{D}{16{,}000}$$

before the change in load resulting from starting to pick up the field load is felt at the polished rod. The angle through which the crank has turned in this time will be given by:

$$\theta = \frac{360\ N}{60} \times t = \frac{360\ ND}{60 \times 16{,}000}$$

$$= ND/2{,}660$$

where:

θ = crank angle in degrees (lag)
N = s.p.m.
t = time to transmit signal to polished rod
D = well depth

For a 16,000-ft. well making 12 s.p.m.:

$$\theta = \frac{12\ (16{,}000)}{2{,}660} = 72°$$

For a 3,300-ft. well making 35 s.p.m.:

$$\theta = \frac{35\ (3{,}300)}{2{,}660} = 44°$$

For a 2,000-ft. well making 20 s.p.m.:

$$\theta = \frac{20\ (2{,}000)}{2{,}660} = 15°$$

During the first 15° of crank angle as measured from the bottom of the stroke, the polished rod moves very little. A slow pumping speed for a moderate depth will show little time lag as is illustrated by Fig. 3. A high speed, even for moderate depth as is shown by Fig. 6, gives a considerable time lag.

The 44° calculated above corresponds to about 15 per cent of the stroke. This is of the order of magnitude found in Fig. 6.

Table 1 lists the percentage of polished-rod travel corresponding to various degrees of crank motion. When used in connection with the values given in Table 2 for various speeds and well depths, Table 1 will give a quick estimate for predicting the approximate point in the stroke at which the traveling valve will close.

For example a 4,000-ft. well pumping at 20 s.p.m. will, from Table 2, have a lag of 30° crank angle. From Table 1 this corresponds to 6.7 per cent of the stroke. Since the plunger motion may lag the polished-rod motion, the actual lag can be slightly more than this.

Application to card . . . The application of the foregoing information to dynamometer cards is easy only when the various factors are of such magnitude as to dominate the load over a portion of the cycle. In Fig. 3, the rod stretch is very predominant and is easily picked out. The downstroke of this card shows a free vibration of the rods of sufficient magnitude to show up clearly.

Fig. 6 is reproduced in Fig. 9, and it happens to be a card on which most of the factors are sufficiently large to show up clearly. Since the card represents a pumping cycle of thirty-five 54-in. s.p.m., the dynamic effects show up better than in slower-speed cards. Because of the high speed, the delay in transmitting the plunger load also shows up in a long delay, that is, the traveling valve opening occurs after the polished rod has traveled considerable distance.

Following this event, the rod-stretch effect is clearly seen. The rod stretch does not dominate the load very long primarily because the dynamic effects are so large. The standing valve action is not as clearly marked as the traveling valve closing. Here again the unloading of the rods shows up even though the dynamic effects are so large.

Near the bottom of the stroke the dynamic rod load again shows up clearly. The spread of the card near the bottom of the stroke is mostly friction. Part of this spread can also occur because of the phase lag in transmitting rod load to the polished rod.

Since the rod load at the time of closing of the standing valve is less than that at the opening of the traveling valve, the plunger will overtravel. This condition is seen to be the reverse of that which occurs in the case of Fig. 3. In Fig. 3 the plunger travel will be less than that of the polished rod.

TABLE 1—PER CENT STROKE VS. CRANK ANGLE
(Assuming simple harmonic motion)

Crank angle	Per cent stroke
0	0
10	0.8
15	1.7
20	3.0
25	4.7
30	6.7
35	9.0
40	11.7
45	14.5
50	18.0
60	25.0
70	33.0
80	41.3
90	50
120	75
150	93
180	100

TABLE 2—LAG IN CRANK ANGLE
(Degrees)

	Strokes per minute				
Depth	10	12	15	20	25
2,000	7.5	9	11	15	19
3,000	11	14	17	23	28
4,000	15	18	23	30	38
6,000	23	27	34	45	56
8,000	30	36	45	60	75
10,000	38	45	56	75	94
12,000	45	54	68	90	113
16,000	60	72	90	120	150

this early HOISTMOBILE...sold in 1923...

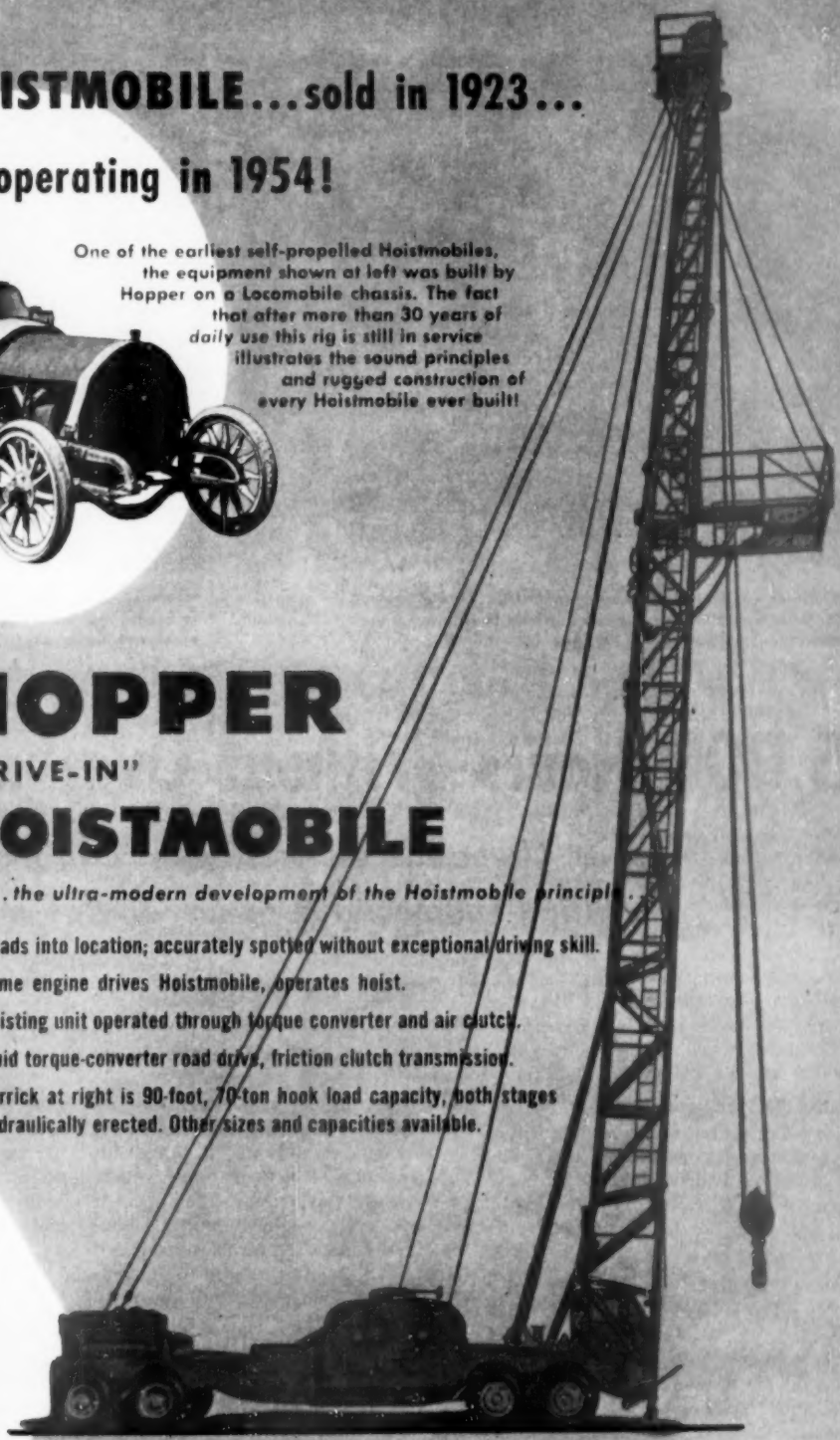
is still operating in 1954!

One of the earliest self-propelled Hoistmobiles, the equipment shown at left was built by Hopper on a Locomobile chassis. The fact that after more than 30 years of *daily* use this rig is still in service illustrates the sound principles and rugged construction of every Hoistmobile ever built!

today's HOPPER "DRIVE-IN" HOISTMOBILE

...the ultra-modern development of the Hoistmobile principle...

- ★ Heads into location; accurately spotted without exceptional driving skill.
- ★ Same engine drives Hoistmobile, operates hoist.
- ★ Hoisting unit operated through torque converter and air clutch.
- ★ Fluid torque-converter road drive, friction clutch transmission.
- ★ Derrick at right is 90-foot, 70-ton hook load capacity, both stages hydraulically erected. Other sizes and capacities available.



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1 A drilling engine just received from service is being stripped down so that the parts may be cleaned in the hot bath in the background. After cleaning, the engine will move into the shop for reassembly.

2 Independent shops perform all cylinder, crankshaft, and head work for Parker Drilling. This is a crankshaft and bearing job under way at Werme Supply Co., Oklahoma City.

15,000 Hours Without Overhaul . . .

That's the service Parker Drilling Co. gets from its drilling engines, due to day-to-day mechanical checkup

by Ed McGhee
District Editor, Drilling and Production

DRILLING engines of Parker Drilling Co., Tulsa, are in service without overhaul for as long as 15,000 hours—the equivalent of almost 2 continuous years. After overhaul, these engines are giving service equal that from new engines.

The key to this "use to the utmost" is a day-by-day record of the operating time of every drilling engine, and an overhaul that is minutely complete.

When a Parker drilling engine reaches the number of hours that experience proves to be the practical maximum or at a convenient time close to the practical maximum (such as during a rig move), another engine of similar size is sent from Parker's Oklahoma City shops for replacement. The engine removed from service is transported to the shops for overhaul.

Company shop pays . . . Parker has found that it can make a saving by maintaining a shop for the overhaul of its own engines, although it would not be economical to perform those phases of overhaul that require a number of single-purpose machine tools. Therefore, Parker Drilling farms out the cylinder, shaft, bearing, and head machining work to independent shops or to the engine manufacturer's representative.

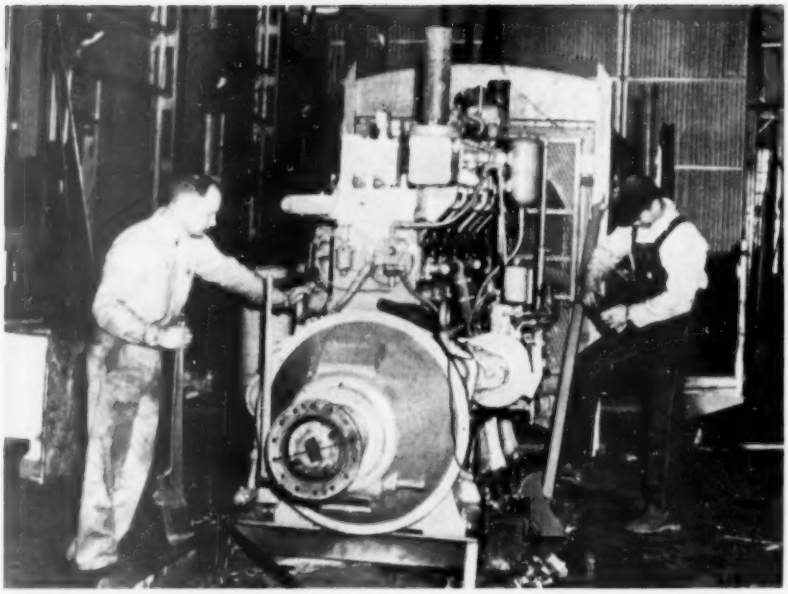
However, the bulk of the work can be done by the chief mechanic, Charlie Reed, and his staff of four mechanics.

First step in the overhaul, seen in Fig. 1, is to completely dismantle the engine and immerse all its components in a hot bath of cleaning compound. After a thorough cleaning in the hot bath, the engine and parts move into the shop proper for inspection, repair, and reassembly.

Individual engines move through the shop in assembly-line fashion, with the repair and reassembly progressing while the engine advances. Several engines are under repair simultaneously, and overhead cranes facilitate moving the engines as work progresses.

Like new . . . After the necessary new parts have been obtained, the engines are reassembled and painted to restore a good appearance. The new appearance is considered to be very important because drilling crews are more inclined to maintain an engine in excellent condition if it has a like-new appearance when they receive it.

It has been found that an overhauled engine should be pressure lubricated before initial startup. Consequently, lubricating oil at 40 psi. is forced into the oil system before the engine is turned over. Then, during the first few minutes of operation, the engine is speeded up and slowed down alternately with the



3 A large drilling engine approaches the final stages of reassembly. As work progresses, the engines move forward in the shop and others are brought in behind.

intent to furnish splash lubrication to the interior of the crankcase.

Afterward, the renovated engine is run at operating speed for a period of 8 hours, and shut down overnight. If on the following morning the engine starts easily and runs smoothly, it is pronounced "good as new" and stored until its return to rig service. Experience has shown that such an overhauled engine will perform as well as it did when fresh from the factory, because defective parts will have been eliminated in use and have been replaced.

Between overhauls, traveling mechanics inspect the engines and perform repairs in the field.

Lighter engines . . . Engines for water pumps, light plants, and other similar services do not lend themselves to accurate record keeping; and Parker relies on the judgment of the operating crews as to when such an engine needs overhaul. These engines also are brought into the Oklahoma City shops for reconditioning.

Air compressors have been found to have an effective operating life about the same as that of the drilling engines. Therefore, records are kept of the operating hours of the compressors, and they are brought into the shops on the same schedule as the engines.

Independents do machining . . . Typical of the independent shops that do precision machining jobs for Parker Drilling Co. and other drilling contractors is Werme Supply Co., of Oklahoma City. Fig. 2 shows an engine being fitted with a chromium-plated crankshaft and aluminum bearings in the Werme shop.

Although more expensive than the conventional "ground down" crankshaft, chrome-plated shafts with aluminum bearings are giving additional operating life to the engines in which installed.

Werme reports that one drilling engine fitted with chrome shaft and aluminum bearings was operated in excess of 18,000 hours without overhaul. Furthermore, the engine was returned to service with the same shaft and bearings and with no work on those parts.

Some engine men are thinking in terms of 25,000 operating hours without overhaul, because of the improved performance of the special shaft and bearings.

Full-flow filters . . . In order to realize the full benefit of the aluminum bearings, an oil filter which receives the entire output of the oil pump should be used. The conventional bypass filter will not remove solid particles in the lubricating oil fast enough to prevent gradual damage to the bearings.

Precision table . . . A helpful fixture in the Parker shop is a "precision table" which has machined surfaces on the top, sides, and ends. Originally built for wartime use to check the alignment of airplane propellers, the table is now employed to check piston rods, camshafts, and some crankshafts. In the case of the rods, they may be clamped securely to the table at one bearing; any misalignment will show up by the rod's not laying flat on the machined surfaces.

4 Drilling engines, auxiliary engines, and air compressors that have completed their trip through the shop are protected from the weather and placed in the yard to await return to service.

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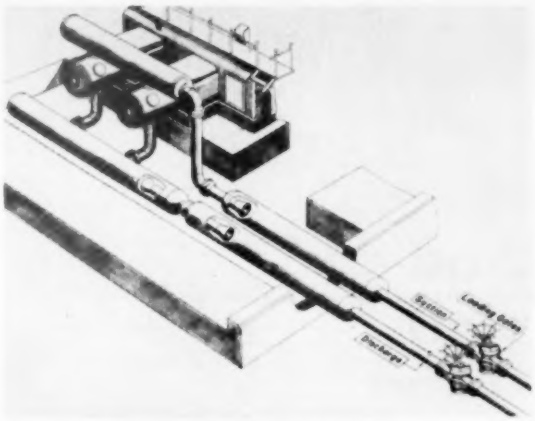
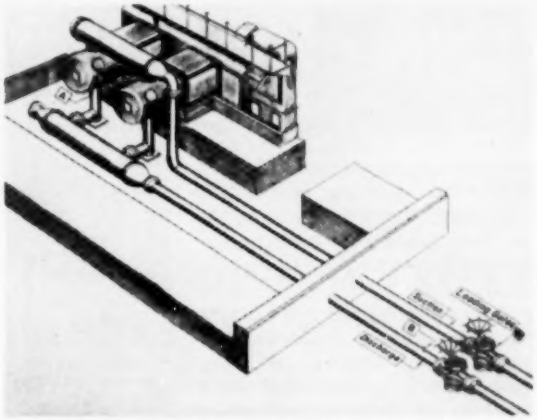


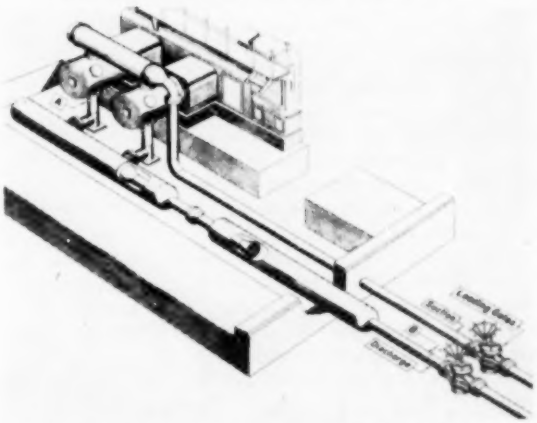
1—NEW PULSATION DAMPENER



2—PIPING BEFORE DAMPENER INSTALLED

Pulsation dampeners . . .

A new concept for the design of effective dampeners that remove the pulsations of fluids and their harmful effects to piping systems. The essence of this concept is straight-through transmission of the fluid through the dampeners without a change in direction, or the use of restrictions to the flow that introduces an excessive pressure drop. This new concept is the basis of the pulsation dampeners now being installed at Gulf Interstate's compressor stations.



3—PIPING WITH DAMPENER INSTALLED

How to Stop Troublesome Pulsation Without Excess Pressure Drop

by Clarence N. Taylor

Part 1 of two parts

IT is now possible to remove, for all practical purposes, the troublesome pulsation and noise from gas piping without paying a premium in the form of excess pressure drop. This represents a new concept in the design of so-called pulsation dampeners. The older concept of snubbers was almost synonymous with large pressure drops.

Yet the approach offered by this new concept is practical and almost unlimited in applications. The principal limitation is that the fluid flowing must be of a compressible nature; however, with appropriate viscosity corrections even this limitation can be overcome.

Fig. 1 shows the new type of pulsation dampeners now being installed on all of Gulf Interstate Gas Co.'s compressor stations. The estimated pressure drop across the dampeners is in the order of 0.1 per cent of the discharge pressure of 935 psig. for a rate of 125 M.M.c.f.d. of natural gas per compressor.

The pressure drop on the suction dampeners is designed to be of the same magnitude as that of the discharge dampeners. These figures are a far cry from pressure drops of 1 per cent or more that are necessary for the operation of the older type of snubbers and have been substantiated from field tests of dampeners installed on operating compressors and designed by the new concept.

Piping revamp . . . Fig. 2 represents the existing piping arrangement on the test unit before the dampeners were installed. This is typical of a normal piping arrangement now in use in the industry.

Fig. 3 represents a modified piping arrangement for the test compressor with the discharge dampener installed.

Here the run of pipe from Point A to Point B and the discharge bottle were removed and replaced with the

dampener, which consists simply of two bottles and their interconnecting tube, and sufficient pipe to tie in with the existing valve. Note the absence of orifice plates, baffles, etc., inside the bottles that make up the dampener. Thus the only pressure drop that can exist is composed of drops for the runs of pipe from the compressor flange to the first bottle, between the bottles, from the second bottle to the valve, as well as the sudden enlargements and contractions inside each bottle.

The use of the swedge is to reduce those sudden changes in area and to minimize the pressure drops involved. The sum of these drops is far below the drop that must be encountered with the use of baffle plates, orifice plates or any other such restrictions that have been used in the older type snubbers.

Instrumentation . . . The instrumentation used to determine the performance of these dampeners consisted of a bonded strain-gage pressure transducer, a three-stage amplifier, and an oscillograph. One set of instruments was used at Point A and a second set at Point B, as shown in Figs. 2 and 3. The oscillograph had a double channel arrangement so that simultaneous recordings were made at both points. The pulsations recorded at Point A represent before the dampener, and those at Point B represent after the dampener.

Fig. 4 is a trace made of the pulsating gas in the normal piping before the dampeners were installed, as shown in Fig. 2. The vertical distance on the trace is the amplitude of the pulsations in pounds per square inch. The horizontal distance is the time in seconds which, when referred to the compressor speed, represents revolutions of the crank. The upper trace was made at Point A and, when calibrated, represents a peak-to-peak fluctuation of 70 psi.

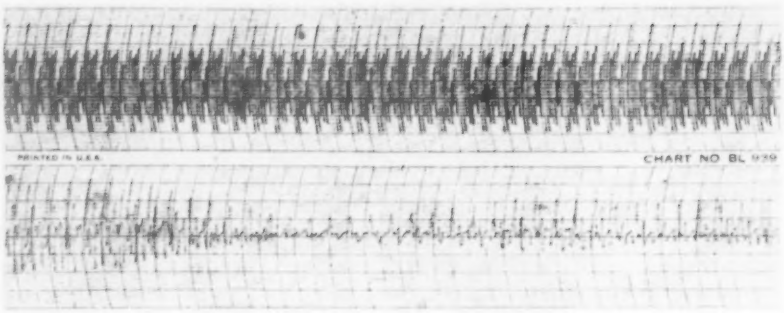


CHART SPEED is 125 mm. per second. Fig. 4.

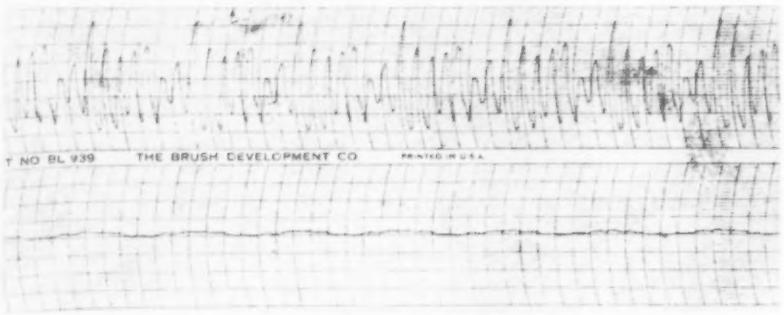
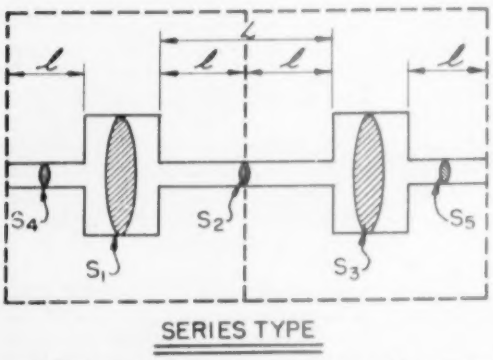


CHART SPEED is 25 mm. per second. Fig. 5

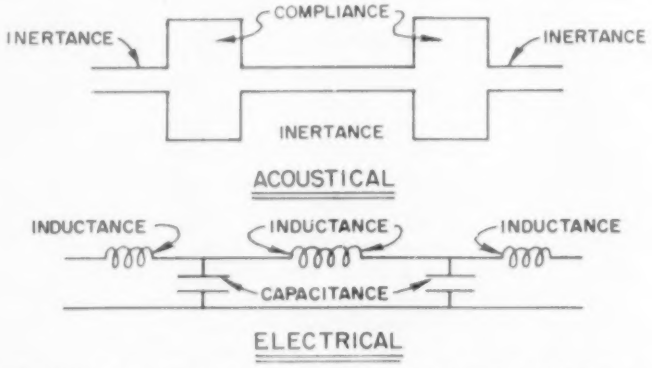
The lower trace, made at Point B, represents a peak-to-peak fluctuation of 30 psi. The pressure drop between these points is in the order of 0.60 psi., or 0.05 per cent of the discharge pressure. Thus, the conventional discharge bottle was effective to a limited degree in reducing the pulsations without an excessive pressure drop.

Piping pulsations . . . The rapid build-up in the amplitude of the pulsations in the lower trace is shown in Fig. 4. This rapid fluctuation of pressure is responsible for the noise that is often heard in piping. The fact that this noise is not always audible to the human ear does not mean that the pulsations as shown are not present. To the contrary, pulsations are always present whenever reciprocating equipment is used with some of the most disturbing frequencies being those that cannot be detected by the average human ear.

The modified shock waves shown in the lower trace are the results of many pressure waves of different frequencies combining in phase to give the sudden rise in pressure. The sections that are the smallest in amplitude are the results of many pressure waves of different frequencies, most of whose phases are such that their amplitudes cancel each other out. The rapid increase in the amplitude of the pulsations means that the majority of the waves are essentially in phase, as men marching across a bridge in step. When the men are in step (in phase) the individual



ACOUSTICAL ELEMENTS that make up the pulsation dampeners are one volume chamber and two pipes of lengths "L." Fig. 6.



RESPONSE CHARACTERISTICS of electrical and acoustical filters. Inductance and capacitance in electrical filters are analogous to pipe and volume chambers, respectively, in acoustical filters. Fig. 7.

DU PONT

PETROLEUM CHEMICALS DIVISION NEWS

DU PONT

March ★ One of a Series of Interest to the Petroleum Industry ★ 1954

"Cavalcade of America" Films Available For Oil Company Use

The story of men and women who helped to shape the dynamic, adventurous growth of America has been brilliantly dramatized on film for Du Pont's television series, "Cavalcade of America."

So far, more than 30 of these historical-interest films have been produced. Their subjects range all the way from the Louisiana Purchase to "Teddy" Roosevelt's early days in the Dakota badlands . . . from pirate Jean Lafitte's part in the defense of New Orleans to Samuel F. B. Morse's invention of the telegraph.

Many of the films deal with the people—and their ideas—who laid the foundation for our tremendous industrial progress. For example, the story of how Eli Whitney became the first mass production manufacturer of firearms . . . how Samuel Slater became the father of the American factory system . . . and how Tom Davenport, a blacksmith, created the first electric motor.

These 28-minute films are ideal for public relations showings. You may also find them useful for entertainment at dealer meetings. Any Du Pont Petroleum Chemicals Division representative or regional office will be glad to help you obtain any of these films on a loan basis.

SALES PROMOTION MANAGER

ROBERT F. HARWICK joined the Du Pont Company in 1950 and was appointed Sales Promotion Manager of the Petroleum Chemicals Division the following year. He brought to this job a broad oil industry experience—ranging all the way from manufacturing to editorial work with a petroleum publication.

ROBERT F. HARWICK

In 1934, Mr. Harwick started with the Gulf Refining Company as a unit operator at their Girard Point Refinery. He was later transferred to the Company's advertising and sales promotion staff at Pittsburgh. In 1948, he joined the *Oil and Gas Journal* as West Coast editor.

At Du Pont, he has been in charge of such customer service projects as the Brand Name Program and the Survey of Consumer Gasoline Buying Habits.

A graduate of Drexel Institute with a B.S. degree in Chemical Engineering, Mr. Harwick served for four years with the U. S. Army during World War II.

Do Service Station *Services* Help Increase Dollar Sales?

Report No. 6 of Du Pont's continuing Survey of Consumer Gasoline Buying Habits points up the relationship between dealer services and volume of product sales

Changing the vocabulary of millions of motorists is a tough job. But gasoline marketers have been highly successful in doing it. What was once known as a "gas station" or "filling station" is today thought of and referred to as a "service station."

In accomplishing this name change, service has become an important part of gasoline marketing. But does it pay off in sales? Report No. 6 on Du Pont's extensive Survey of Consumer Gasoline Buying Habits contains statistics to take the answer to this question out of the "hunch" category.

THE IMPORTANCE OF SERVICE as a service station sales stimulant is highlighted in Report No. 6 of the Du Pont Survey of Consumer Gasoline Buying Habits.

Report No. 6 covers specifically services given by dealers and services wanted by the motorist. Based on 3,100 household interviews and 21,000 observations at 1,193 service stations, the survey was conducted by National Analysts, Inc. It is countrywide in scope.

Importance Of Oil Check

All of the motorists interviewed were asked what they considered the *most important* dealer service. *Oil check* was the answer given by more than 90% of them.

And the station observations showed that the more often oil was checked by the station attendant, the more often oil was sold. Yet only a small percentage of the total number of customers were *offered* an oil check. Many of

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

PETROLEUM CHEMICALS DIVISION
NEWS

CONTINUED

Service Survey

them *had to ask* for it. And the largest percentage of motorists neither asked for nor were offered an oil check.

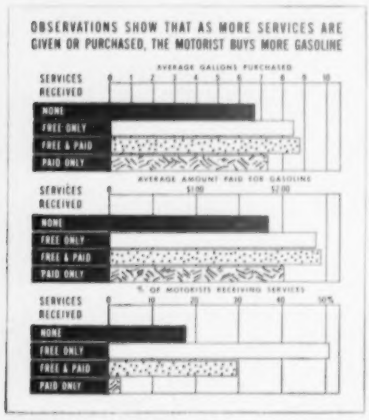
Who Was Offered An Oil Check?

Owners of newer and more expensive cars were offered the oil check more frequently than owners of older cars. Yet, the chances are that the older cars are more likely to need additional oil between changes . . . and therefore represent a greater potential market for oil.

In addition to oil check, Report No. 6 covers consumer attitudes toward many other important dealer services —both free and paid. You'll find in it detailed information on the number of motorists who *expect* to have their windshields cleaned with every stop . . . how many motorists would like to have tire pressure and battery water checked more frequently . . . and even the relationship of these services to tire and battery sales. It also contains data on paid services . . . plus data on the stimulating effect of these services on sales.

Sales-Service Ratio

The station observations show that the motorists who received the most service purchased the most gasoline. On the

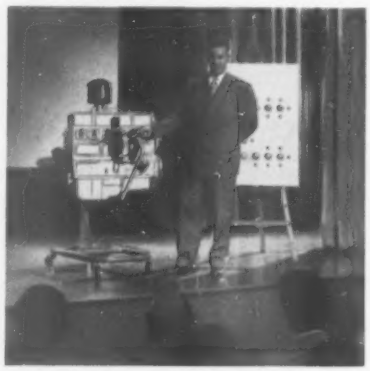


A TYPICAL CHART from Report No. 6 shows the relationship between free and paid services and gasoline sales.

average, motorists who received free service bought 2 gallons of gasoline more than those who received no service at all. And those who received paid service purchased, on the average, slightly less than one gallon more than those who received no service at all.

Engineering Talks On Automotive Service Problems

As an aid to oil company fuel and lubrication engineers, personnel from the Technical Section of the Du Pont Petroleum Chemicals Division are prepared to conduct a technical conference on automotive service problems.



The conference is designed for those directly concerned with the performance of fuels and lubricants in the field. And it is expected that the material covered in the conference will prove extremely helpful to these engineers in answering customer complaints involving service problems.

Broad Range Of Topics

Five important topics are covered in the conference: 1. exhaust valve burning; 2. induction system deposits; 3. road testing of gasoline; 4. ignition system and spark plug fouling; 5. engines and their octane requirements. The individual talks range in length from 35 to 50 minutes. And the complete conference takes about half a day.

The fundamental principles underlying the specific operating problem are covered in each talk. The speakers use these principles to explain the problems in a manner which suggests methods of assuring trouble-free operation.

Experienced Speakers

Each talk is given by a well-qualified member of the Petroleum Chemicals Division's technical staff. All have had years of experience in their respective subjects in the Du Pont laboratories, in oil refineries and in technical service activities.

The talks, however, are informal and easy to follow. Each speaker is well trained in public speaking. And the talks are amply illustrated with colored slides.

Available To Oil Companies

This conference is available to any oil company. And it may be scheduled for any time at a location most convenient for the audience. If you are interested in obtaining the conference for your automotive service group, you may request it from any Du Pont Petroleum Chemicals Division regional office or representative. To insure that all speakers are available, we suggest that you make arrangements well in advance.

Complete Information Available

In addition to Report No. 6 which is now being distributed to marketing executives, the full and complete information collected by this survey on services is recorded on IBM cards. This information can be cross tabulated to provide seasonal, regional, and other specialized breakdowns. These cross tabulations are available to oil company market research groups through the Petroleum Chemicals Division's Wilmington office.

The Survey of Consumer Gasoline Buying Habits is part of a continuing Du Pont marketing study program. Work is already under way on a new study which will contrast dealer attitudes and beliefs with those of consumers.

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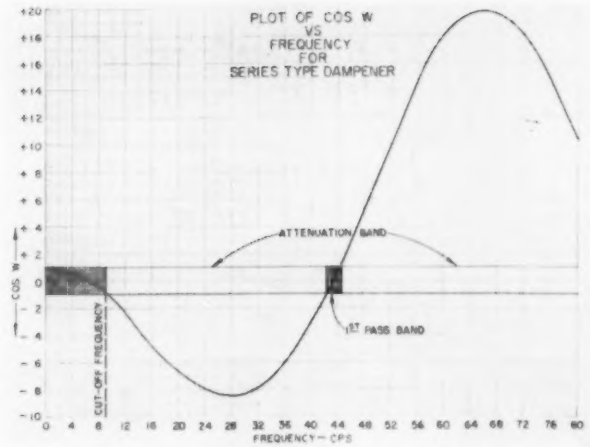

Fig. 8

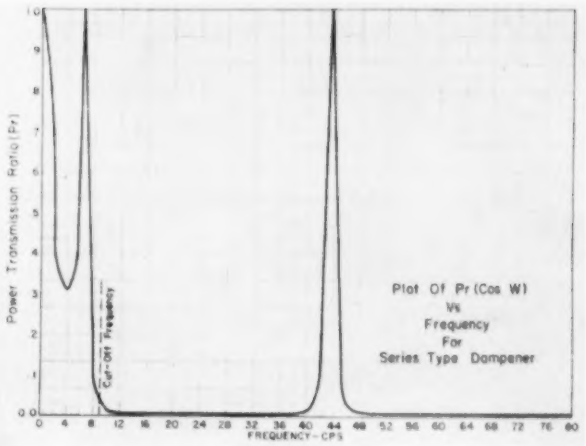

Fig. 9

forces or amplitudes add and can produce serious results. On the other hand, if the men are at random step, the results are not as severe. This analogy applies to the pulsations inside the piping.

Fig. 5 shows the simultaneous oscillograph traces made for the new type dampener, after being installed as shown in Fig. 3.

Point A (upper trace) represents before the dampener and Point B (lower trace) represents after the dampener. The magnitude of the upper trace is in the order of 70 psi., peak-to-peak fluctuation while the magnitude of the lower trace is in the order of only 3 to 4 psi. This represents a reduction in pulsations in a ratio of approximately 20:1, with a pressure drop in the order of 1.25 psi. or 0.15 per cent of the discharge pressure. This then introduces an increase of pressure drop above that of the piping arrangement in Fig. 2 of 0.1 per cent. The lower trace at Point B indicates that the base frequency of the pulsations (r.p.m./60) is passed by the dampener, although it has been greatly reduced in amplitudes. The theory of the design, as will be presented later, predicated that this frequency would be passed.

The dampener was tested through a wide range of compressor speeds, clearance pocket settings, and compression ratios, and gave excellent performance for all conditions tested.

THE AUTHOR

Clarence N. Taylor is a member of Gulf Interstate Gas Co.'s engineering department. He is a graduate of University of Houston, with bachelor and master's degrees in mechanical engineering.

Acoustic Theory Is Basis

The acoustic theory used in the design of the dampener is not new. It was initially set forth by W. P. Mason, G. W. Stewart, R. B. Lindsay, and others. Unfortunately, the essential elements of the design have been buried in library reference books, and omitted from standard college text books on acoustics for more than 20 years. With these elements at hand, a pulsation dampener can be designed for effective operation without excessive pressure drop.

The dampener shown in Fig. 3 is designated series type pulsation dampener. The name arises from the arrangement of the various acoustical elements that make up the dampeners. These elements are shown graphically in Fig. 6.

The complete unit consists of two sections as shown by the dotted lines. Each section is composed of one volume chamber and two pipes of lengths "l." The interconnecting pipe between these volume chambers has a total length of $L = l + l$. While two sections are used to compose the dampener, more than two sections can be used.

The decision to use only two sections was made on the basis of the most economical design versus increase in effectiveness. The more sections used for a dampener, the greater the effectiveness. However, the practical limit for the economical design lies between two and three sections. It was felt that the cost of the additional sections outweighed the increased performance for Gulf Interstate Gas Co.'s design.

Electrical analogy . . . The electrical analogy of the dampener is known as a low pass filter. The acoustical series type filter is identical to the electrical Constant K low pass filter.

In Fig. 7 the inductance and capacitance shown in the electrical filter are analogous to the pipes and volume chambers respectively. The response characteristics of this electrical filter are well known and its attenuation is sharp and easily controlled. This filter is extremely valuable and has widespread uses in electrical apparatus.

First design step . . . The first step in the design of the serious-type dampener is to determine the disturbing frequencies. These frequencies are functions of the speed of the compressor. The simplest case is one single-acting cylinder. If the speed is expressed in revolutions per minute divide by 60 seconds per minute. This is then the base frequency of the disturbing frequencies. Other frequencies encountered will be whole number multiples of this base frequency, and if left undampened may cause pipe or concrete support failure as a result of fatigue and in addition can cause a serious noise condition.

If more than one single-acting cylinder is driven from the same crankshaft, the crank angle between the discharge becomes important, particularly so when two cylinders discharge almost together. The base frequency for double-acting cylinders is twice that of the single-acting cylinders.

Series dampener . . . The series-type dampener is an acoustical low pass filter. That is, it will pass low frequencies up to the cutoff frequency, beyond which attenuation will begin and continue to exist, except for some periodic frequencies known as pass bands. Thus, the very nature of the filter or dampener is such that most high frequencies will be dampened. The undampened high frequencies are important since they are those passed by the dampener and may fall on a harmonic of the base frequency.

(Continued on page 112)

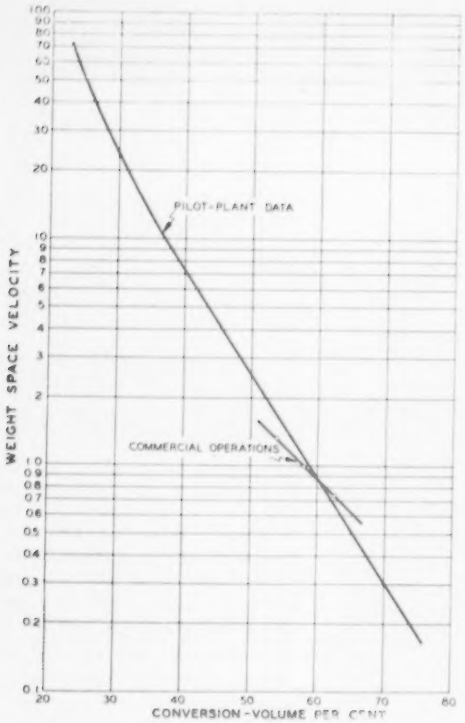

Fig. 1—Effect of weight space velocity on extent of conversion, operation at constant catalyst-to-oil ratio for fluid catalytic cracking.

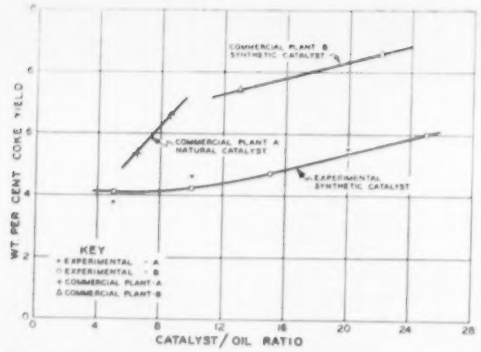

Fig. 2—Effect of catalyst-to-oil ratio on coke yield, for fluid catalytic cracking at constant conversion.

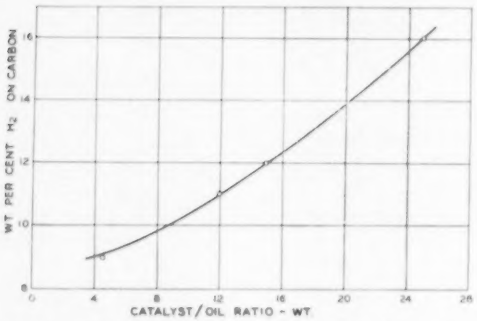

Fig. 3—Effect of catalyst-to-oil ratio on hydrogen content of coke, for fluid catalytic cracking.

OPERATING THE CAT CRACKER—4

Space Velocity and Catalyst-to-Oil Ratio Together Provide a Measure of Cracking Severity

- Weight or volume basis in fluid and moving-bed units.
- Effect of changing space velocity on conversion.
- Effect of changing C/O ratio on coke yield.
- Severity factor can be used for correlating severity conditions.

by J. W. Moorman

TWO of the most important variables in catalytic cracking are the space velocity and the catalyst-to-oil ratio. The catalyst-to-oil ratio divided by the space velocity represents what has been termed the "severity factor." This severity factor is the major variable controlling the extent of conversion in catalytic cracking.

Author is consulting engineer in catalytic cracking, specializing in both fluid and moving-bed techniques.

Space Velocity

The space velocity can be expressed by two methods; namely, on a volumetric or a weight basis.

Volumetric basis . . . In the T.C.C. type of process the volumetric basis is normally employed and is expressed in the terms of volume of cold oil per hour divided by the volume of catalyst in the reaction zone. Obviously, this can also be expressed on a weight basis. However, since the volume in the reactor is fixed by design and the catalyst density in the reactor will vary over an extremely narrow range (probably 10 per cent or less) it is far more convenient to employ the volumetric basis. Furthermore, the quantitative value of the volumetric and weight bases are almost identical. Thus, with a catalyst density of 50 lb. per cu. ft. and a 30° A.P.I. oil a 1.00 V/Hr./V is equivalent to a 1.09 W/Hr./W.

Weight basis . . . In the case of the fluid catalytic cracking process, however, it is not practical to express the space velocity on a volumetric basis for a number of reasons. First, the catalyst particle size can vary considerably from

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unit to unit or in a given unit, depending upon the catalyst recovery system, the design of the unit, and the type of catalyst employed.

Another factor influencing the amount of catalyst in the reaction zone in the fluid process is that of gas velocity which has a marked effect on catalyst density. Consequently, in most fluid catalytic cracking unit designs the reactor is designed so that the catalyst withheld can be varied, with the result that the space velocity represents a separate operating variable and is expressed on a weight basis in the form of weight of oil per hour divided by the weight of catalyst in the reaction zone (W/Hr./W).

Fixed spaced velocity . . . However, whether expressed on a volumetric or a weight basis the space velocities in the T.C.C. type or fluid type of processes are synonymous and the effects are identical. The T.C.C. unit is always designed with a fixed space velocity and can only be varied by making mechanical changes. The space velocity in the designed unit has been predetermined by pilot-plant experiments for the specific feed stock and catalyst. Consequently, the effects of space velocity that are presented herein are based upon available information from commercial and pilot-plant data obtained on fluid catalytic cracking units, and as previously stated can be related directly to the T.C.C. type of operation when expressed on a common basis, either volumetric or weight.

Changing space velocity . . . By definition, the space velocity simply expresses the fact that as the space velocity is increased the amount of catalyst in the reaction zone is decreased. Therefore, the amount of catalytic surface that is available is lowered and as a consequence the severity of cracking will decrease, thereby lowering the conversion. Conversely, decreasing the space velocity will increase conversion.

This is demonstrated in Fig. 1 wherein with a constant catalyst-to-oil ratio, constant reaction temperature, and for a specific type of catalyst and a specific feed stock the extent of conversion of the gas oil is increased by decreasing the space velocity. Included in Fig. 1 are data obtained from pilot-plant operations under carefully controlled conditions. Included also are data obtained on a 15,000-bbl. per day commercial unit. As would be expected, the effect of space velocity on extent of conversion was different for the two operations due to differences in operating conditions such as feed stock, catalyst, etc. However, the qualitative trends are identical and have been further checked by additional experimental work.

Too high or too low . . . The effect of space velocity on product distribution at a given conversion level is somewhat obscured by the fact that in order to maintain constant conversion while varying the space velocity it is necessary to change other variables. However, there are indications that extremely low space velocities are detrimental. On the other hand, high space velocities in a continuous process introduce other problems as discussed below.

Catalyst-to-Oil Ratio

The other variable in the severity factor is the catalyst-to-oil-ratio (C/O). Here again the variable may be expressed on either a volumetric or weight basis. The volumetric basis is normally employed for the T.C.C. and Houdriflow processes and the weight basis is employed for the fluid processes. As in the case of space velocity the basis employed has been predicated upon practical rather than theoretical considerations.

C/O for moving bed . . . In the case of the T.C.C. and Houdriflow processes the catalyst circulation rate can be measured on either a weight or volumetric basis. The circulation rate can also be calculated by either heat balances or carbon balances. The latter, of course, must be on a weight basis. However, since the space velocity is always expressed on a volumetric basis the C/O ratio is similarly expressed.

C/O for fluid bed . . . In the case of the fluid processes the C/O ratio is always expressed on a weight basis. Just as in the determination of space velocity, changes in such conditions as catalyst particle size, gas velocities, unit design, etc., preclude any practical means of measuring catalyst circulation rate. Such means as pressure drop and use of venturii meters and other methods have been tried without success. Consequently, it is common practice to determine the catalyst circulation rate by heat and/or carbon balance calculations.

As for space velocity, it can be seen that the volumetric C/O ratio and weight C/O ratio are synonymous and it is to be expected that the qualitative effects in catalytic cracking will be identical.

High or low C/O ratio . . . The subject of low versus high catalyst-to-oil ratio in catalytic cracking has long been a controversial problem. It is maintained in some quarters that high catalyst-to-oil ratios are beneficial whereas in other quarters the low catalyst-to-oil ratios are favored. It is obvious when considering the process that the catalyst-to-oil ratio will in effect control the catalyst residence time in the reactor. It is a well-established fact that the longer the catalyst is in the reaction zone the more deactivated it becomes due to carbon deposition, thereby decreasing its potential cracking ability.

Carbon on spent catalyst . . . The effect of C/O ratio on spent-catalyst carbon content for a hypothetical case can be demonstrated quite simply by calculation. Thus, if it is assumed that the carbon content, on regenerated catalyst, of 0.5 weight per cent is maintained, with a coke production of 6 per cent on feed, then the carbon content of the spent catalyst and thus the average carbon content of the catalyst in the reactor will be as follows:

TABLE 1—C/O RATIO AND CARBON ON SPENT CATALYST

C/O ratio	Carbon on spent catalyst	C/O ratio	Carbon on spent catalyst
2	3.5	8	1.25
3	2.5	10	1.1
4	2.0	15	0.9
6	1.5	20	0.8

These data have no practical significance other than to demonstrate the effect of catalyst to oil ratio on the carbon content of the spent catalyst, or in other words, the residence time of the catalyst in the reaction zone.

Changing C/O ratio . . . For a specific unit, therefore, varying the catalyst-to-oil ratio will also vary the catalyst residence time in the reactor which in turn will vary the carbon on spent catalyst. Thus, it is extremely difficult to isolate the true effect of varying catalyst circulation rate, since in order to maintain constant conversion it is necessary to vary the catalyst holdup in the reactor thus varying the carbon content of the spent catalyst. This may well have a greater significance in the cracking reaction, governing the quantity of freshly regenerated catalyst which contacts the oil in a given time. Nevertheless, a series of studies have been made both commercially and on the pilot plant scale to determine insofar as possible the true effect of catalyst-to-oil ratio.

In general it has been demonstrated experimentally that in increasing the catalyst-to-oil ratio in the range of 5 to 20 at constant conversion, reaction temperature and catalyst activity will result in the following:

1. Increase coke yield.
2. Decrease dry-gas yield.
3. Decrease hydrogen yield.
4. Decrease butane yield.
5. Decrease liquid recovery.
6. Little effect on C4-free gasoline yield.

There is little effect on gasoline octane number, though there is a decrease in gasoline gravity and an increase in aromatic content.

Coke yield . . . In Fig. 2 is presented some data obtained on two different experimental units and two commercial units illustrating the effect of C/O ratio on coke yield at constant conversion. These data are quantitative only for the specific units, feed stocks, catalyst, etc., from which the data were obtained and are presented merely to illustrate the effect of C/O ratio on coke yield and, consequently, on unit capacity, that has been observed not only in pilot and experimental units but also on many commercial units. It is interesting to note that the experimental data, wherein it is possible to control other variables to a more exact degree than is possible on commercial units, indicate that there is very little effect of C/O ratio in the range of 5-10. This is of particular importance when considering unit design and potential feed-stock quality.

Hydrogen content of coke . . . Since it appears that increasing catalyst-to-oil ratios tend to increase coke production the effect is probably the result of lessening the time in which the coke is permitted to decompose to catalytic carbon and dry gas in the stripping zone. This has been further demonstrated by careful test work on experimental units which illustrated a marked effect of catalyst to oil on the coke hydrogen content. In Fig. 3 is presented the relationship obtained during one series of test runs. This increase in coke hydrogen content with increasing catalyst-to-oil ratios obviously has a large effect on unit capacity having a fixed combustion air supply. This is illustrated in Table 1.

TABLE 1—EFFECT OF HYDROGEN CONTENT OF COKE ON UNIT CAPACITY)

(Synthetic catalyst; CO_2/CO ratio = 1.22; 10 per cent excess air—50 per cent relative humidity; 6 per cent coke on feed)

Wt. per cent H_2 in coke:	Lb. air/Lb. coke	Unit cap. (B/D)
10	12.72	15,000
12	13.31	14,300
14	13.91	13,720
16	14.5	13,200

Optimum C/O . . . The choice of the proper or optimum catalyst-to-oil ratio for either a new or existing fluid catalytic cracking unit is dependent upon a number of variables. It is indicated from the foregoing data that low catalyst-to-oil ratios are probably preferable down to approximately 4 or 5, depending on the effect of high carbon content of the spent catalyst on product distribution. However, catalyst-to-oil ratios in these ranges do present a problem in that operation is limited from the standpoint of feed-stock boiling range, since most of the feed stocks will have to be vaporized before being charged to the unit.

High catalyst-to-oil ratios are detrimental of course from the standpoint of coke production and unit capacity, but on the other hand, high C/O does permit charging much heavier feed stocks to the unit—feed stocks that do not have to be vaporized in a preheat furnace.

The optimum catalyst-to-oil ratio for a given unit therefore is dependent upon investment costs, feed-stock quality, and degree of flexibility desired. It is indicated that, when operating for the production of motor gasoline, the preferred cat-oil ratio should be in the range of 5-10/11.

Severity Factor

As previously indicated the severity requirements for a given operation in catalytic cracking are primarily controlled by the catalyst-to-oil ratio and the space velocity. It has been found that within a relatively narrow range the catalyst-to-oil ratio divided by the space velocity will be the controlling factor in the cracking reaction. This factor, termed the severity factor, can be used for correlating severity conditions.

Cracking severity . . . It is known that the catalyst-to-oil ratio cannot be substituted directly by the space velocity over a very wide range. For example, halving the space velocity will have the effect of increasing the conversion level to a greater degree than doubling the catalyst-to-oil ratio. Nevertheless, over the normal operating ranges involved in the production of motor gasoline, the severity factor as expressed above can be used as a measure of the severity of cracking conditions, when analyzing commercial-unit performance.

When recycling operations are involved, the severity factor can be expressed on either the basis of fresh feed or on the basis of total throughput. In any study concerning the effect of severity factor on plant operation such variables as catalyst activity, catalyst carbon content, feed-stock quality, etc., must be taken into consideration since any of these variables can change the severity of catalyst requirements in order to obtain the desired feed stock conversion level.

A Look at Round 2 of NH_3 Expansion

(Continued from page 91)

example, operation at a relatively lower pressure might be desirable.

Most plants in the United States employ the lower-pressure processes, roughly those in the range between 2,000 and 5,000 psi. Shell's Ventura plant, for instance, operates at close to 4,500 psi.; Spencer's new Vicksburg works is designed to operate at 3,600 psi. On the other hand some of the plants now under construction, such as that of Deere & Co., at Pryor, Okla., and the Grace plant at Memphis, will employ the high-pressure Casale method at about 12,000 psi.

Rate and equilibrium . . . Both are important in the ammonia synthesis. While reaction rate at a given pressure and temperature can be increased considerably through the use of the proper catalyst, the equilibrium limits the conversion that can be obtained per pass. This conversion is often only about 12 to 15 per cent but may go to 20 per cent in some cases.

Converter . . . Since an economic reaction rate requires operation at a relatively high temperature, close to that at which catalyst tends to deactivate, rapid removal of excess heat is important to minimize both catalyst deactivation and attack on construction materials. According to the method of heat removal, converters are generally of two types: (1) those in which the gas flow and heat exchangers are arranged to minimize temperature differences in the catalyst, and (2) those providing for cooling of the gases between layers of catalyst.[6]

Evolution of heat in ammonia synthesis is not uniform through the catalyst, with existence of hot points which are apt to shift as catalyst ages and operating conditions change. The Kellogg converter, an example of the Type 2 reactor, is therefore designed to approach point-by-point temperature control. Fig. 2 shows the quench-type Kellogg converter. Here inlet synthesis gas passes through the shell of the exchanger section of the converter and is preheated by heat exchange with effluent gases leaving the bottom catalyst basket and going through the exchanger

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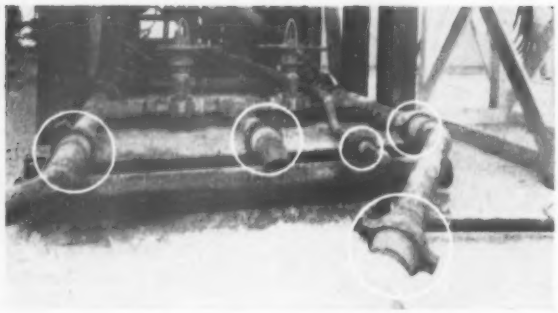

WECO Fig. 602 Unions on the rig's mud line.

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tubes. Amount of preheat is controlled through bypassing a portion of the feed gas around the exchanger. Cooling between catalyst layers is accomplished by quench gases.

Description of other converters is given by Hein,[6] the Fauser-Montecatini under Type 2, and the N.E.C. (Nitrogen Engineering Corp.), Mont Cenis and T.V.A. under Type 1.

● UREA BY MONTECATINI . . .

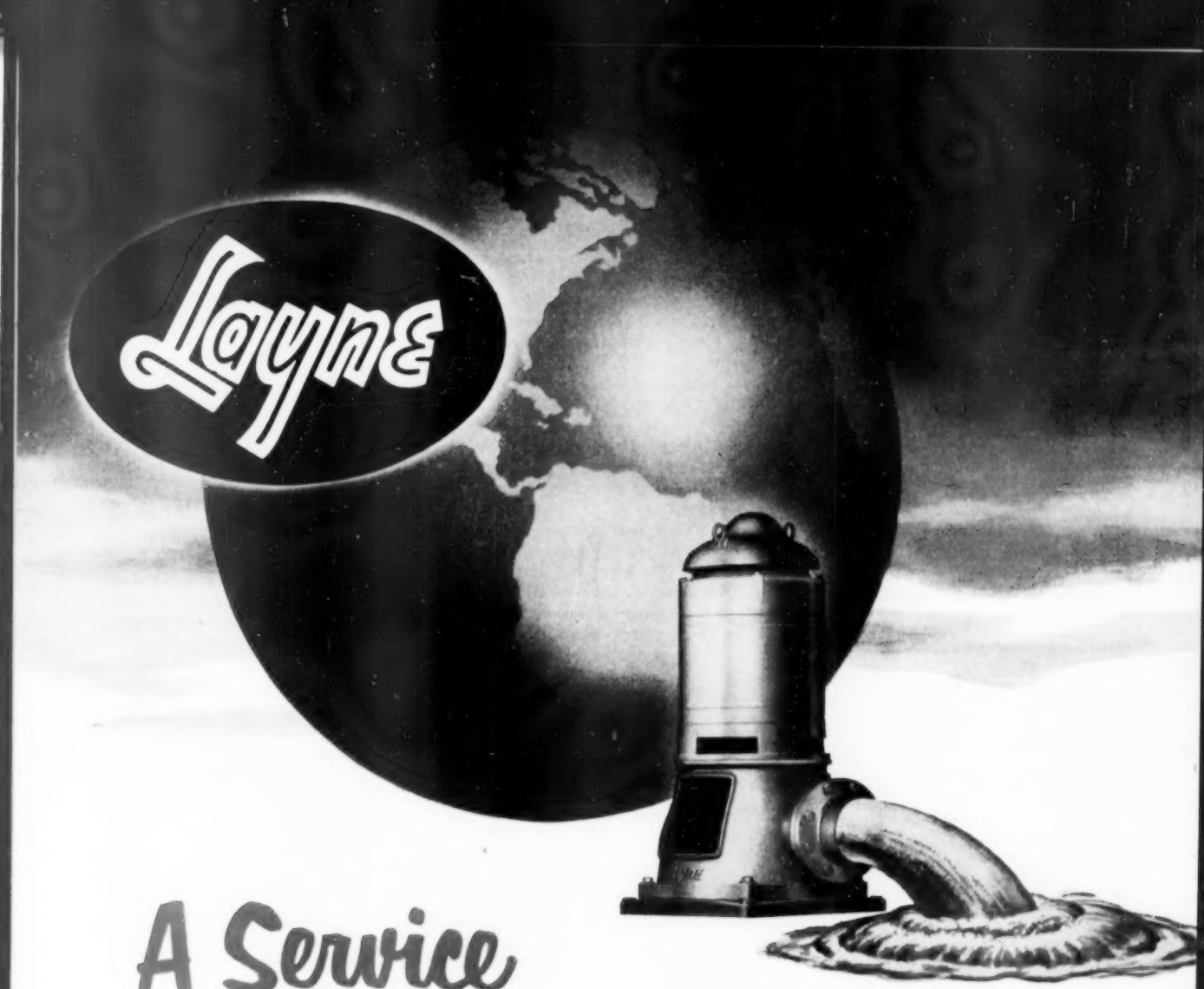
As in the Pechiney and other processes for making urea, a two-step method is employed. Carbon dioxide and ammonia are reacted to form ammonium carbamate. This is decomposed to urea and water. Since conversion per pass is low, a recycle process may be employed. In the Pechiney process, for example, ammonium carbamate is recycled as a solid in a neutral oil. The salt-oil slurry is held at a low temperature to insure production of carbamate as a finely dispersed solid.

Partial recycle . . . The Montecatini process employs what is termed a partial recycle (Fig. 3). A relatively low temperature is employed in the reactor in which CO_2 reacts with a recycled aqueous solution of carbamate and fresh ammonia. Urea and carbamate which are formed leave the top of the reactor through an expansion valve. In the combination expander - condenser vessel carbamate breaks up into ammonia and CO_2 which flash off into the upper condensing section. Steam condensate is added here, and the mixture after adding fresh NH_3 is recycled as a liquid back to the reactor.

Urea solution with some carbamate leaves the bottom of the expander-condenser through an expansion valve. Unreacted ammonia and CO_2 are steam stripped. Overhead gases from the stripper can be neutralized. Alternatively, these may be selectively separated and used again in a total recycle version of the process now being developed. The urea is processed to obtain crystalline urea product. Traces of lubricating oil and other impurities are removed in the crystallizer feed tank. The solution is filtered. Following crystallization an air drier takes water content down to 0.3 weight per cent.

The expander-condenser vessel is designed to permit recovery of nearly 75 per cent of the unconverted CO_2 and NH_3 in solution leading to substantial reduction in the compression load ordinarily required for a partial recycle process. Material balance and product quality are given in Table 3.

Advantages cited for the Montecatini



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urea process are: (1) low operating cost due to relatively mild operating conditions and reduction of corrosion by virtue of presence of excess ammonia; (2) reduced initial investment in compressors and pumps due to utilization of partial recycle of ammonium carbamate rather than as ammonia and carbon dioxide per se; (3) high yields obtained, amounting to some 70 per cent by weight of ammonia and 80 weight per cent of the carbon dioxide; (4) production of resin-grade urea also suitable for use in feed supplements, and (5) on-stream efficiency of 90 per cent indicated by data obtained in semicommercial plant.

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How to Stop Pulsation

(Continued from page 105)

The so-called cutoff frequency should, for best results, be set below the base frequency of the compressor. To define this cutoff frequency requires the use of an indicator called Cos W. It must be able not only to predict the frequency at which attenuation begins, but must also define those frequencies through which transmission of the pulsations will occur most intensely. The reader is referred to standard works on acoustics for the classical derivation of Cos W. The indicator, for the dampener shown in Fig. 3 is:

$$\text{Cos W} = \text{Cos } (720\text{fL/c}) - (\pi\text{vf/sc}) \sin (720\text{fL/c}) \quad (1)$$

Thus, this equation represents a cyclic function that will assume negative and positive values. It is possible by derivation to define the frequencies of attenuation, as those for which the value of the indicator is: Cos W $> \pm 1$. Those frequencies for which the indicator has values of Cos W $> \pm 1$, are those frequencies that will be transmitted most intensely, and this group of frequencies is known as pass bands.

Indicator plot . . . A plot of this indicator is shown in Fig. 8 in which the indicator (Cos W) is assigned values from 0 to +20 and from 0 to —10 on the ordinate. The frequencies are plotted along the abscissa, and expressed in cycles per second.

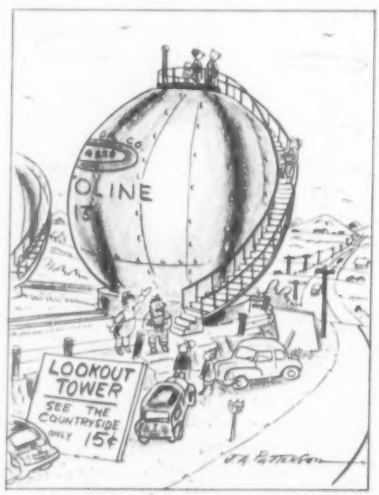
The shaded portions of the graph represent those frequencies for which the indicator has values between ± 1, and are those frequencies within which high transmission of pulsations will occur. The other frequencies for which the values of the indicator are Cos W $> \pm 1$, are those for which attenuation will occur. The indicator is, therefore, able to predict the frequencies of transmission and attenuation, yet is not able to predict how good the attenuation is nor how bad the transmission is.

To do this, a second equation must be introduced. This equation is actually a ratio of the average energy flow in the transmitted wave at the outlet of the dampener to the average energy flow in the incident wave at the entrance of the dampener. The equation may be expressed for the dampener shown in Fig. 3 as:

$$P_r = [1 + 4\,(\pi\text{vf/sc})\,\text{Cos}^2\,\text{W}]^{-1} \quad (2)$$

Power-transmission ratio . . . The use of the indicator, Cos W, in this equation enables a close correlation between the two equations. A plot of the power-transmission ratio is shown in Fig. 9.

The power transmission ratio has a range of values between 0 and 1, with all values being positive. A ratio of 1.0 would indicate full transmission which, is possible. In fact, actual measured ratios may reach values in excess of 1.0 which would indicate amplification of the transmitted wave. This condition which must be avoided at all cost, is most likely to occur from some resonant condition in the piping.



"Sure, you got a good side line—If th' boss just won't object."

The peculiar dip shown in the curve to the left of the cutoff frequency has been definitely established from field tests. This dip represents the resonant condition for a combination of the interconnecting tube and the smallest volume chamber, as shown in Fig. 3. This dip will generally occur at one-half the cutoff frequency. Notice that this dip is not broad in frequencies; nevertheless, it may play an important part in the design of the dampeners.

The dip may be set at the frequency of (r.p.m./60) for the case of a double-acting cylinder, and the cutoff frequency set below that base frequency at twice the compressor speed. Immediately following this dip, the transmission returns to a ratio approaching 1.0 or full transmission. However, field tests show that this peak transmission is extremely narrow in frequencies. Fortunately, the transmission ratio drops extremely fast following this peak and approaches its minimum value.

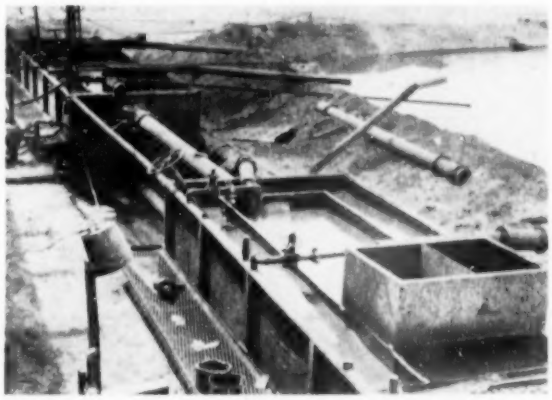
The nature of the equation denies a ratio of zero at any frequency. The low transmission ratio will continue to exist until the narrow range of frequencies, known as the first pass band, is encountered. Once again, for this resonant condition of the dampener, the power-transmission ratio approaches a value indicating almost complete transmission of the pulsations. Since the indicator of attenuation, the Cos W, is a cyclic function, the existence of this and other recurring resonant conditions of the dampener cannot be denied.

This represents a condition that must be investigated for each dampener. The exact width of this peak transmission band is not precisely known. The best field test made to date indicates that the first pass band is not very broad, usually a few cycles wide. Succeeding pass bands will definitely cover fewer frequencies as the frequencies are increased. Thus, an important condition of the design rests on the location of these pass bands in relation to harmonics of the base frequency of the compressor.

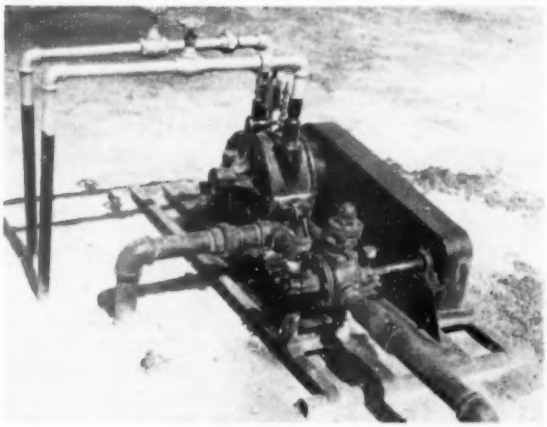
A possible safe location of the first pass band would be just higher than the tenth harmonic of the base frequency of a single-acting cylinder, or the fifth harmonic for double-acting cylinders. It is unfortunate that, at this time, it is almost impossible to predetermine the amplitudes of the various possible frequencies that will exist for any given compressor. Many methods have been proposed but, to the author's knowledge, none have been successful. A great deal of research must yet be done on this complex problem.

. . . Our roving photographer knows a helpful idea when he sees it

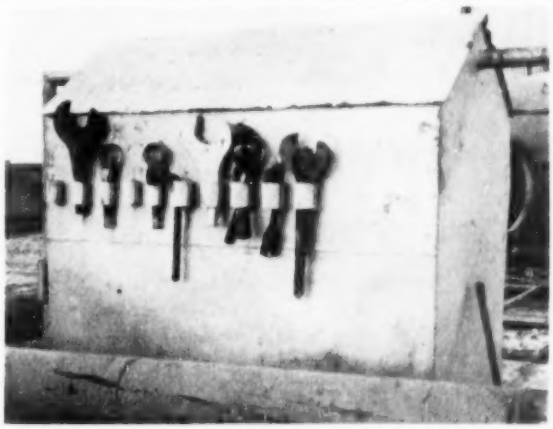
Vertical posts for guard enclosures around this oil-well pumping installation are made of 2-in. tubing set in concrete in a 4-in. nipple. Horizontal railings are made of sucker rods.



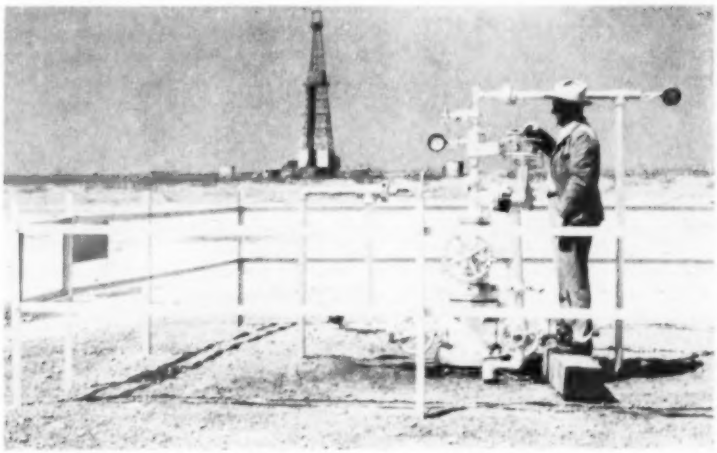
Modern mud-tank construction in Vealmoor field. Note the double compartment, web walkways, and manifolding on this unit, used by Hewgley Drilling Co., of Midland, Tex.



This pump, which circulates chemical solution for breaking crude-oil emulsions in Prentice field, Yoakum County, Texas, is driven by a gas-powered turbine motor.



Pump tools are mounted as shown here on the side of the pump-parts house at Shell Oil Co.'s Rig 14, in Denton field, New Mexico. Thus they are always at hand.



Here is an intermittent gas-lift installation operated by Cities Service Oil Co. in Dollarhide pool, in West Texas.

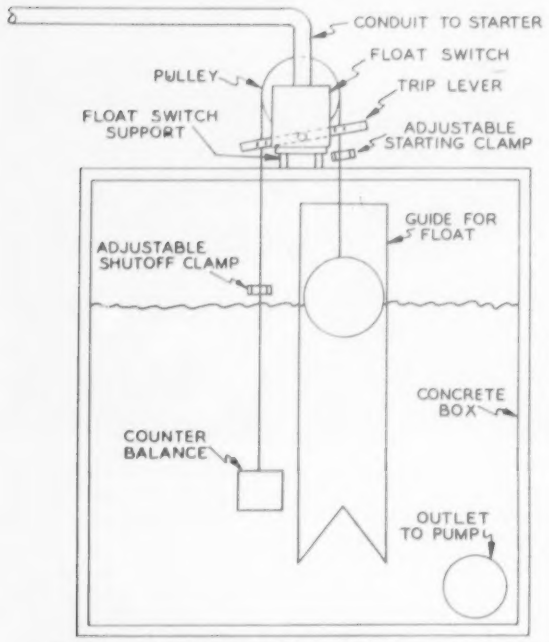


Fig. 1—Salt-water disposal installation in Magnolia Petroleum Co.'s Luling field employs standard-type float switch.

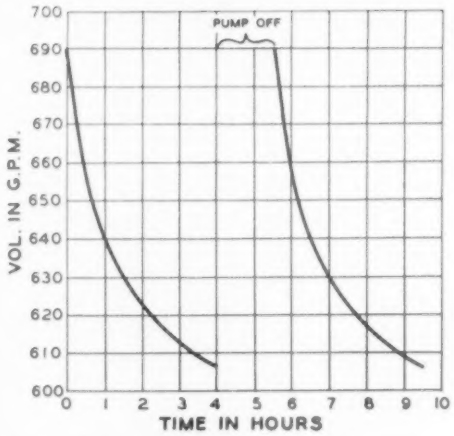


Fig. 2—Pump volume-time chart shows advantage gained by employing float switch.

Automatic disposal of salt water

. . . effected with float switch with built-in water-level control device

by David Walker

IN order to handle automatically the huge volume of disposal salt water in Magnolia Petroleum Co.'s Luling field, Ernest Upshaw, district powerplant superintendent, has employed a float switch with added features as the water level control device for operating the disposal-well pumps.

A 5 by 5 by 5-ft. concrete box with a standard-type float switch installed on top is placed between the salt-water pit and the disposal pump at the proper level with inlet lines from the salt-water pit and an outlet line to the pump.

As the water flows by gravity from the salt-water pit into the box, the box fills and the float rises within its guide pipe (see diagram) until the clamp on the pulley line trips the float switch level starting the pump. The pump then disposes of the salt water in the pit until the water level in the box (being approximately the same as that in the pit) causes the float to lower to the point where the clamp on the counterbalance pulley line trips the float switch off, shutting down the pump.

Of course, all the salt-water pits in Luling field are not of the same dimensions and do not have the same distance between high and low-level mark. This variation in the difference of the desired water levels is readily compensated for by adjusting the clamps on the pulley line. By this method high and low-level differences of 6 in. to 3 ft. can simply and accurately be regulated by sliding the adjustable clamps closer or farther apart. Because of the small pressure differential (the maximum of 1.3 psi.), Upshaw feels, gives superior performance as compared to the mercoid-type switch. All wells at Luling, in fact, operate below a .7-psi. pressure differential.

To insure proper automatic operation of the pump the following steps have been taken: The concrete is placed so that the high and low levels in the pit will lie within the box and the low-level point at least 12 in. above the outlet pipe to prevent whirlpooling. The pump is placed several inches below the low-water mark in the concrete box, thus being self-priming. The inlet pipe has twice the area of outlet pipe to the pump to allow the gravity-fed inlet water to keep pace with water going out under suction to the pump. A screen is placed across the middle of the concrete box to act as a filter for debris and a long V is cut out in the bottom of the float guide pipe to make sure sediment accumulating on the bottom will not prevent water from reaching the float. The pulley wire is plastic coated and the float is copper because of the corrosive action of the salt water.

The advantage gained by the accuracy of the float switch can readily be seen by a graph of a pump's volume-time chart.

As seen from the graph the pump starts off at a high efficiency which gradually lessens as the back pressure from the water being pumped into the formation builds up until the low-water level is reached. The pump then shuts off. During the time the pump is off, the pumped water has time to spread into the formation, lessening the back pressure, so that when the pump starts up again it is operating at a higher efficiency. Thus, not only does the pump operate at a higher efficiency while running but also it has a chance to rest. To prevent the water flowing under back pressure, a check valve is put between the well and pump.

The maintenance requirements on the entire disposal unit are daily oiling of the pump, weekly cleaning of the screen, and monthly checks on the sediment accumulated in the concrete box.

Author is engineer with Magnolia Petroleum Co.

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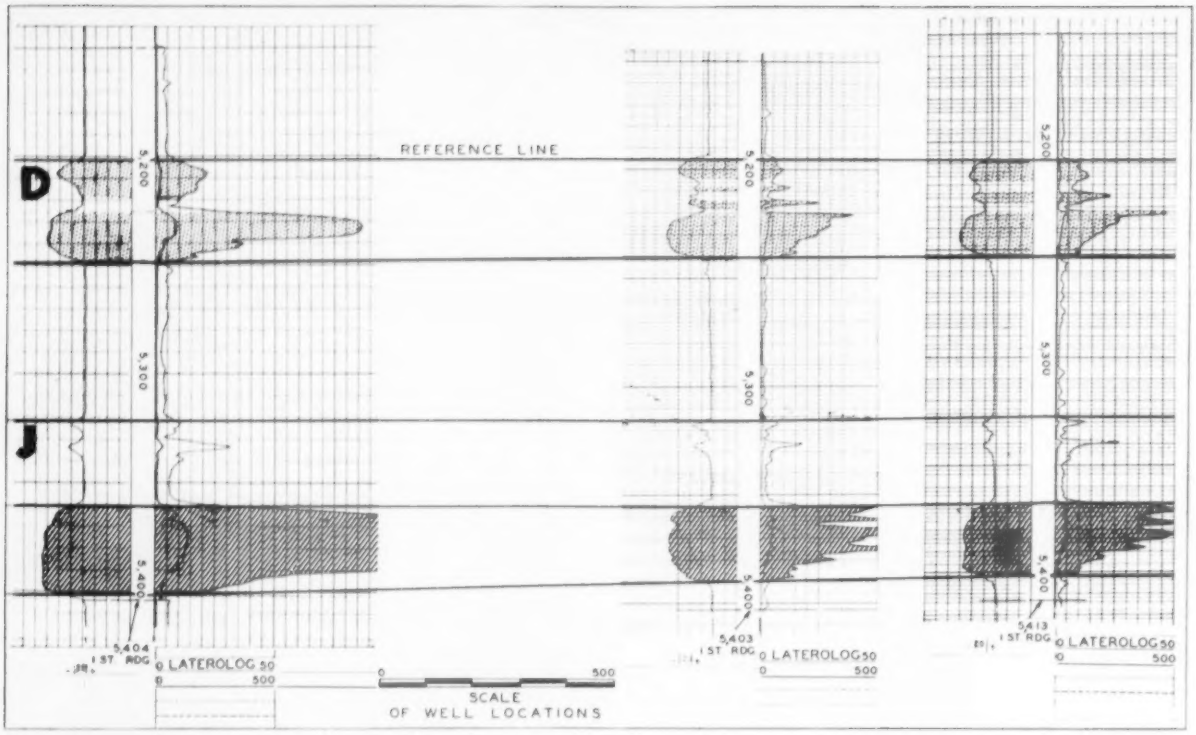


STRATIGRAPHIC TRAP oil accumulation in J sand of Dakota-Graneros series is exemplified by this west-east geologic cross-section of Lewis Creek oil field, Colorado. J sand reservoir pinches out to east. Line of section appears in Fig. 2. (Fig. 1).

LEWIS CREEK, COLORADO . . .

Where Digging Is Fast and Easy

Six days from surface shoe to Dakota coring point at 5,200 ft.

by Joseph A. Kornfeld

DRILLING is fast and easy in the new Lewis Creek oil field in Logan County, Colorado. This is one of the newer developments on the eastern rim of the Denver-Julesburg basin. Only 6 days are consumed in reaching coring point at 5,200 ft. from the time cement plug is drilled under the surface casing. Over-all time from skidding rig to cementing casing on long string is only 15 days.

One of the more prolific fields in initial oil rates in the Denver-Julesburg basin, Lewis Creek has 10 oil wells on production. Individual initial oil rates ranged from 200 to 500 bbl. of oil per day. Field output averaged 1,585 bbl. per day during December 1953.

Subsurface Geology

This stratigraphic trap produces from the third bench in the J sand, a member of the Dakota-Graneros sandstone series of Upper Cretaceous age. Reservoir pinches out at east, updip side in this 5,400-ft.-deep oil field. (See Figs. 1 and 2).

Oil column ranges from 30 ft. in 1 Union Pacific R. R. Co., NE NE NE 13-11n-53w, to 42 ft. in 1 Jorritsma, NE SW SE 12-11n-53w, the discovery well.

Field Statistics . . . Lewis Creek Field, Logan County, Colorado

METHOD OF EXPLORATION: reflection seismograph.
TYPE OF STRUCTURE: stratigraphic trap, terrace, sand pinches out to east.
DATE OF FIELD DISCOVERY: July 24, 1953.
DISCOVERY OIL WELL: British-American Oil Producing Co. 1 Jorritsma, NE SW SE 12-11n-53w, completed for 485 bbl. of oil per day through ½-in. choke from 5,360-70 ft.
WELLS:
Oil wells (all on pump, January 1, 1954) 10
Deepest well drilled: British-American's 3 U. P. R. R. C NE NW 13-11n-53w, total depth 5,678 ft. in O sand of Lakota series.
WELL SPACING: Spacing pattern is center of each 40-acre tract by order of Colorado Oil and Gas Conservation Commission.
OIL PRODUCTION: Average daily oil production (December, 1953) bbl. 1,585
MARKET OUTLET: Toronto Pipe Line Co. via Sterling Pipe Line System to Platte Pipe Line Co.
PRINCIPAL OPERATOR: British-American Oil Producing Co.
Number of active drilling rigs (January 1, 1954) 2

High permeabilities of the producing zone are indicated from core data. Permeability to air averaged 1,549 md. in one well. Porosity averaged 24.2 per cent, and connate-water saturation was 23 per cent.

British-American Oil Producing Co.'s 1 Jorritsma, NE SW SE 12-11n-53w, opened Lewis Creek field on July 24, 1953. Discovery well was drilled on a reflection seismograph anomaly near the West Peetz field. Initial oil rate was 485 bbl. of oil per day and no water through ½-in. choke; perforations were from 5,360-70 ft. in the J sand.

Spacing pattern . . . All new wells are being drilled in the center of each 40-acre tract, a departure from the early development spacing arrangement. In October 1953 the Colorado Oil and Gas Commission granted application of British-American for 40-acre spacing after hearing British-American reservoir engineers testify that one well would drain 40 acres.

Drilling Practices

British-American has contracted all wells drilled to date at Lewis Creek with Sterling Drilling Co., and the firm presently has two rotary rigs operating in this field.

Sterling's Rig 2 is a 600-hp. model mounted on a 126-ft.-high, 440,000-lb.-capacity steel mast with a 7-ft.-high substructure. Power is developed by three drilling engines rated at 220 hp. each. A single 7¾ by 16-in. mud pump works off of No. 3 engine.

Flat terrain found at Lewis Creek permits rig to be skidded to each new location. This operation consumes about 6 hours and a few additional hours are required to rig up and set surface pipe.

TYPE WELL LOG-LEWIS CREEK FIELD
British-American Oil Producing Co.
1 Jorritsma, NE SW SE 12-11n-53w.
Elevation 4,582 ft. kelly bushing.

Cretaceous:	ft.
Niobrara chalk	4,385
Fort Hays limestone	4,671
Codell shale	4,743
Greenhorn limestone	4,942
Bentonite	5,108
D sand	5,202
J sand	5,361

Cutting surface hole . . . Crews cut a 13¾-in. hole to 215 ft. in which a 9⅝-in. surface pipe is set. From 160 to 200 sacks of cement are placed behind the pipe. Operators have reduced waiting-on-cement time to only 24 hours on surface pipe.

Shoe is drilled under surface casing with 8¾-in. bit and long hole is cut through third bench of J sand usually to top of Fuson shale found at about 5,450 ft.

Penetration rates are fast throughout the soft Cretaceous shales, especially for the first 3,600 ft. Sterling drilled 1 U.P.R.R. Co., NE NW NE 13-11n-53w, to 5,200 ft. in only 9 days and only 15 days were consumed in total time.

Mud program . . . Water is used to drill until a depth of 4,000 ft. is reached. In this first 4,000-ft. interval, viscosity is held at from 40 to 45 seconds, A.P.I., water loss at from 10 to 15 cc., and wall-cake thickness at 2/32-in.

At 4,000 ft. prepared mud is added. Averages for the 4,000 to 5,000-ft. interval are as follows:

Weight, lb./gal.	10
Viscosity, secs. A.P.I.	60 to 70
Water loss, cc.	4 to 6
Wall-cake thickness, in.	2/32

Little difficulty is encountered in keeping bore hole straight. Maximum deviation recorded to date in Lewis Creek wells has been 3° and most wells are held to less than 2°. Inclination surveys are run from a depth of 500 ft., at intervals of 500 ft. until contract depth is reached.

Drill collars are made up on the drilling string when 8¾-in. bit is run under the surface pipe. Only three 6-in. collars are used throughout the bore hole.

Diamond coring . . . Wells drilled early in the field life were cored for reservoir data. However, most of the wells drilled later are evaluated by drill-stem testing and electric logging. Coring is conducted principally in the J sand lenses using a 50-ft.-long, 6¼-in.-diameter diamond core barrel.

Drill-stem testing is employed in evaluating most of the developmental wells in this field. After well has been drilled through the sand lenses in the J series, and electric log has been run, operators determine whether or not to run drill-stem test. If test is to be run, straddle packer is run, using 7½-in. packer in 8¾-in. hole. Straddle test serves to exclude large quantities of water usually found in lower portions of pay sand.

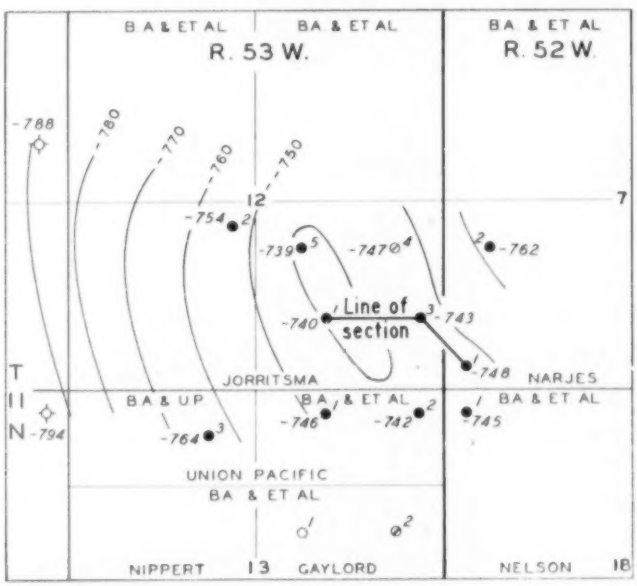
Completion Practices

A string of 5½-in. 15-lb. J-55 casing, equipped with float shoe and float collar, is set through "J" sand. Centralizers and rotating scratchers are used to provide a reliable cement bond. About 200 sacks of cement are mixed and placed behind long string. After cementing is completed, rotary rig is skidded to a new location, and cable-tool unit rigged up and hole cleaned out to a previously determined plug-back depth.

Casing is perforated in a section of 4 or 5-ft. A jet perforating gun is run and four jet shots made per foot of pay. Afterwards, well is cleaned up and prepared for production. Production on tubing may be either 2 or 2½-in. A 1¾-in. bottom hold-down insert-type pump is employed.

Early in the field life, a number of flowing completions were made. However, all completions are now placed on the pump initially.

Oil is moved by Toronto Pipe Line Co. to Sterling Pipe Line System. The latter ties in with Platte Pipe Line Co. main trunk line traversing southwest Nebraska.



SUBSURFACE STRUCTURE contour map of Lewis Creek field, Colorado, prepared on top of J sand. (Fig. 2).

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How to Size Vapor-Relieving Systems—1

A method has been developed which is applicable to compressible fluids where pressure, velocity, and specific volume are constantly changing

by Joseph Conison

- **A.P.I.-A.S.M.E. and A.S.M.E. codes.**
- **Sizing of relief valves.**
- **Relief valve characteristics.**
- **Line sizing method.**

THE design of a vapor-relieving system is one of the most important problems of good plant design. Upon this relieving system rests the safety of personnel, protection of equipment and product, and elimination of shutdown time.

The introduction of balanced relief valves has made design engineers more conscious of relief header design, especially when the saving of pipe can be made.

By using certain types of balanced valves, the back pressure in the blowdown header can rise to a maximum of 80 per cent of the design pressure of the minimum designed vessel without affecting the relieving pressure of any valve in the system. Where valve capacity is affected by back-pressure conditions (i.e., when the back pressure rises above the critical) then the addition of balanced valves may be more than compensated by the savings in piping and labor costs. There is also the added feature of improved safety of valve relief under abnormally high back pressure.

Back pressure can also be increased when using standard valves by lowering the set pressure of the valve if the operating pressure is not too close to the vessel design pressure. If the relief valve is of the standard disk variety, then the back pressure can also be increased at the expense of lowering the relieving pressure of the valve if the guide is plugged and the bonnet is vented.

Finally, on the basis of the maximum back pressure permitted in the system, the use of the Crocker formula simplifies calculations in selecting pipe sizes for determining maximum vapor capacity at the corresponding terminal pressure.

A relieving system may consist of one or more relief valves manifolded into one common header for the prime purpose of disposing safely vapors from overpressured equipment to a remote area of plant site.

To adequately size the laterals from the relief valves and also the common header, the designer must consider:

1. The A.P.I.-A.S.M.E. or the A.S.M.E. codes, whichever governs for the specific case.
2. Relief-valve operating characteristics and capacities.
3. Design pressure of the operating equipment associated with the relief valves.
4. Line capacities and line lengths.
5. Physical properties of vapor to be relieved.

Unfired Pressure-Vessel Codes

The prime purpose of the A.P.I.-A.S.M.E. (1951) and the A.S.M.E. (1950) codes is to establish regulations for safe practice in the design, construction, inspection, and repair of unfired pressure vessels, etc., for the handling of petroleum and other hazardous liquids and vapors.

In accordance with the A.P.I.-A.S.M.E. and the A.S.M.E. codes, all unfired pressure vessels, other than unfired steam generators, shall be protected by pressure-relieving devices that will prevent the pressure from rising 10 per cent above the maximum allowable working pressure, except when excess pressure is caused by fire or other unexpected source of heat. In the case of overpressure due to the latter, the pressure-relieving devices shall be capable of preventing the pressure from rising more than 20 per cent above the maximum allowable working pressure of the vessel, when all pressure-relieving devices are blowing.

In the case of the outlet pipe, the size shall be such that any pressure that may exist or develop in the discharge line will not interfere with the capacity of the safety device.

The two codes are of utmost importance because they are the limiting factors in selecting the size and type of relief valves to be used, as well as selecting the diameter of the relief or blowdown headers.

The size of the relief valve is dependent upon the pressure differential across the valve plus the per cent accumulation available. The type of valve used, whether standard or balanced, determines the per cent accumulation and the pressure drop allowed for friction loss in the relief header. The amount of friction loss allowed in the relief header determines the diameter.

Spring-Loaded Nozzle-Type Relief Valves

General practice is to design the relief valves to start relieving at the design pressure of the vessel, and to reach its full relieving capacity at 3 to 10 per cent above the design pressure. (The design pressure will be interpreted as the maximum allowable working pressure.) This overpressure is generally termed "accumulation," and is based on the per cent pressure rise from the time the valve begins to open to the time when the valve is fully open.

Nozzle-type relief valves are available today in the "standard" or "balanced" disks or bellows. For a complete discussion of the different types available, the reader is referred to A.S.M.E. Paper No. 51-8A-18 by Chessler and Jesser. (See also Refiner's Notebook series in The Oil and Gas Journal, issues of March 3 to July 21, 1952, inclusive.)

"Standard" type . . . This is affected by the back pressure in the downstream piping. In the disk type, if the guide is vented and the bonnet is plugged, then the relieving pressure of the valve will be linearly in-

Author is senior instrument engineer, Fluor Corp., Ltd. Paper presented at A.S.M.E. semiannual meeting, Los Angeles.

creased with the increase of back pressure. This arrangement will result in raising the relieving pressure of the valve. For example, if a relief valve is designed to open initially at 100 psig. with a 100-psi. differential and 10 per cent accumulation, and the back pressure is raised to 10 psig., then the valve will begin to open at 110 psig. and relieve its maximum design capacity at approximately 120 psig. If the vessel is designed for 100 psig., then the A.P.I.-A.S.M.E. code shall have been violated by permitting the internal vessel pressure to rise 20 psi., or 20 per cent, above the vessel design pressure, even though the valve was originally set to open at the vessel design pressure of 100 psig.

On the other hand, if the guide is plugged, and the bonnet is vented, then the relieving pressure of the valve will be lowered with increase in back pressure. (Changes in valve relieving pressures are a function of the differential exposed area of the disk which varies with the valve size and also with the manufacturer.) This arrangement results in the valve relieving in all cases below the initial set pressure. Many process industries use this type of valve plugging when two or more valves are manifolded together. The reason is that if the back pressure rises above atmospheric, loss of some of the product out the vent system is preferred to jeopardizing the equipment. The disadvantage, however, is that process upsets may be created in areas other than in the one in which the vessel or vessels are relieving.

For example, consider that vessels A, B, and C are relieving. Consequently, their escaping vapors create a back pressure in the relieving system. If a relief valve located on vessel D is of the type mentioned above and vessel D is far removed from, and not associated in the process with vessels A, B, and C, then a back pressure developed in the relieving header may cause it to open. By opening the valve on D below the set pressure, the normal operating pressure may be disturbed, thereby creating an upset if the pressure in the vessel is above or below the header pressure.

Balanced type . . . The set pressure on a balanced type of valve theoretically would not be affected by back pressure built up in the relief header. However, due to imperfections in manufacture, and limitations to practical design, the balanced valves available today will vary in relieving pressure when the back pressure reaches 25 to 80 per cent of the "set" pressure, varying, of course, with different manufacturers. The gain obtained in permitted back-pressure design may be the difference in many header systems between one, two, or more pipe sizes.

Capacity formula . . . The vapor-relieving capacities for both types of relief valves are limited by the following formula:

$$W = CKAP\,(M/ZT)^{1/2} \quad (1)$$

where:

W = pounds per hour of gas or vapor

C = constant of the gas or vapor based on the ratio of the specific heats, k; where $k = C_p/C_v$. (See Fig. 1 for values of C.)

K = coefficient of discharge of the valve, which is generally 0.97 for nozzle-type relief valves in vapor or gas service

A = nozzle throat area, sq. in.

P = accumulated inlet pressure,

$$\text{psia.} = p\left(1 + \frac{\text{\% accumulation}}{100}\right) + 14.7$$

p = inlet pressure psig.

M = average molecular weight of vapor or gas

Z = compressibility factor (generally omitted)

T = absolute inlet temperature, °R. = (°F. + 460)

For vapors where the ratio of specific heats is not known, the conservative value of k equal to 1.001 is used. If K = 0.97, then CK = 315 × 0.97 = 306, and is commonly used by the A.P.I. and A.S.M.E.

Critical flow . . . Equation 1 is based on the assumption that critical flow occurs through the orifice of the valve. This condition of critical flow exists when the outlet pressure of the valve is never above 50 to 60 per cent of the absolute inlet pressure; or precisely, when the outlet pressure does not exceed P_2:

$$P_2 = P_1\,[2/(k+1)]^{k/(k-1)} \quad (2)$$

where:

P_2 = absolute outlet pressure of valve, psia.

P_1 = absolute inlet pressure of the valve, psia.

$$k = C_p/C_v = \frac{\text{Specific heat at constant pressure}}{\text{Specific heat at constant volume}}$$

As long as the back pressure does not rise above P_2 in Equation 2, then critical conditions will prevail, and maximum flow will occur through the valve.

As an example, assume that the critical pressure, P_2, on the outlet of a specific relief valve is 50 psia. and the relieving inlet pressure, P_1, is 100 psia. Then, as long as the back pressure in the header does not rise above 50 psia., maximum flow will occur across the valve. If the pressure rises above 50 psia., then the flow will diminish.

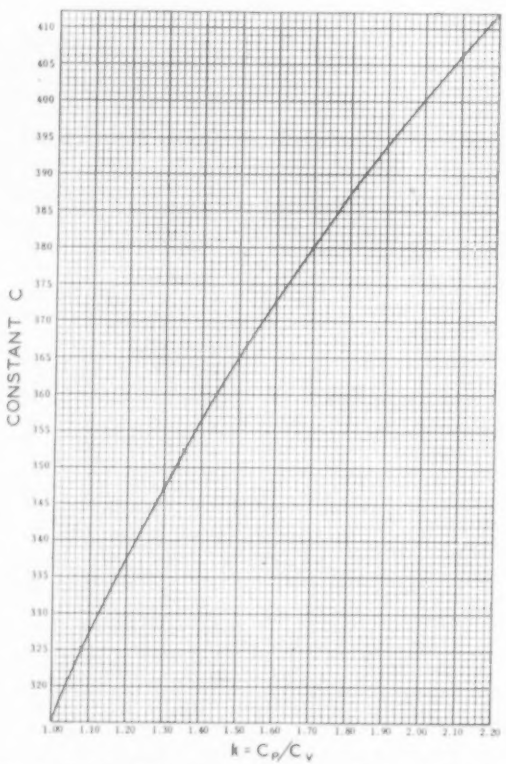

Fig. 1—Values of Constant "C" used in Equation 1; basis 1950 A.S.M.E. and 1951 A.P.I.-A.S.M.E. Unfired Pressure-Vessel Code.

ELECTRIC LOGGING—21

More on Apparent vs. True Resistivity

by R. I. Martin

IT will be recalled that the ratio Ri/Rm is similar to the formation factor. If the sand were clean, if the mud filtrate completely displaced the original fluids, and also if the mud filtrate has the same resistivity as that of the mud itself, then Ri/Rm is in fact equal to F, the formation factor. In practice this is not generally the case.

Possibly the necessary information has been obtained from laboratory tests on cores and muds. If it has not, satisfactory results may often be obtained by making certain assumptions. It is possible to consider the effects of the three factors jointly rather than individually. For example, in a certain area, the mud resistivity, displacement of original fluids, and amount of clay in the sands may be reasonably constant from well to well.

In order to secure consistent results in several cases it may be apparent that a certain value of Ri/Rm should be used in preference to any other. Within the limits of accuracy of these charts, namely the fact that they are only available for Ri/Rm equal to 6, 11, 21, and 51, it is usually fairly easy to select a value of suitable magnitude.

As an approximate guide, Ri/Rm is of the order of 6 to 11 for clean sands of high porosity, about 11 to 21 for medium porosity and some clay content, and higher than this for tight sandstones and limestones.

Fig. 1 of Installment 20 shows a chart for Ri/Rm = 11, with several families of curves for each value of Rt/Rm. The complete family is not shown in each case, however, to avoid too much overlap of the curves. The first family are for the case where the true resistivity is 21 times that of the invaded zone (Rt/Ri = 21). This gives a value of Rt/Rm of 231. This corresponds to:

1. Highly resistive formations, such as limestones or oil-bearing sandstones with connate water of low salinity.

2. Moderately resistive formations when the mud has an exceptionally low resistivity.

The solid line is for the case when Di/d = 1. That is, no invasion has taken place, so that the curve is the same as that on the chart for no invasion. Other values of Di/d namely 2, 5, and 10 correspond to moderate, deep, and excessive invasion. These are shown as broken lines below the solid curve.

The complete family for these values is shown for the case when Rt/Rm is equal to 55. This may correspond to an oil-bearing sandstone with regular mud.

When Rt/Ri = 1, the degree of invasion does not affect the measurements, because the bed is homogeneous for practical purposes. Only one curve is necessary therefore, for Rt/Rm = 11.

When Rt/Rm = 1, the curves for invasion show higher values, and may correspond to salt water sands. Alternatives may be oil bearing, very shaly sands, or moderately resistive sands when the mud resistivity is exceptionally high.

Inspection of the foregoing series of charts shows that under certain conditions the departure of Ra from Rt is not very great. Table 1 shows intervals of values of Ra/Rm within which the apparent resistivity is not more than 20 per cent different from the true resistivity.

Comments on the table are:

1. The intervals of values of Ra/Rm are highly variable with the different factors involved, spacing, and invaded zones. In many cases they are narrow. Several cases show no values at all. This means that with these values of Ri/Rm and Di/d the device considered does not record values approaching the true resistivity.

2. The table shows that for AM = 15 d and AO = 35 d, there is a comparatively broad, regular interval of values for all the values of Ri/Rm and Di/d shown in the table.

3. For smaller spacings, the intervals are narrower. In order to be sure that Ra/Rm is actually within the correct interval it is necessary that Ri/Rm and Di/d be known more closely.

Table 1—Apparent resistivity is not more than 20 per cent off the true resistivity for these intervals of values of Ra/Rm. (From Schlumberger Well Surveying Corp., Document 4).

Ri/Rm	NO INV.	6				11			21			51	
Di/d	1	2	5	10		2	5	10	2	5	10	2	5
Normal AM=15d	0.1-40	0.1-35	0.1-30	1-150		0.1-35	0.1-35	1-200	0.1-30	2-200	3-200	10-40	—
AM=10d	0.1-20	0.1-20	0.5-150	About 30		0.1-25	2-300	About 50	0.5-15	20-400	About 100	—	200-1500
AM=7d	0.1-15	0.1-15	3-120	—		1-20	10-300	—	10-500	40-150	About 100	About 1000	100-250
Lateral AO=35d	0.1-50	0.1-50	0.1-30	0.1-40		0.1-40	0.1-40	0.1-70	0.1-60	0.1-60	1-60	1-60	10-50
AO=25d	0.1-30	0.1-30	0.1-25	0.5-40		0.1-50	0.1-40	4-70	0.1-40	1-40	4-120	10-15	—
AO=15d	0.1-15	0.1-20	0.5-120	3-40		0.1-15	1-60	—	1-25	40-150	About 100	—	About 250
AO=10d	0.1-10	0.1-15	5-35	—		0.5-10	20-60	—	—	About 100	—	About 250	100-200

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

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ANOTHER LEADING OIL PRODUCING AREA WHICH HAS DEPENDED ON BIW EQUIPMENT.

What Causes Lost Circulation?

by J. M. Bugbee

LOST circulation, the loss of whole mud in quantity to exposed formations, plainly requires the presence of permeable zones with openings of sufficient size to permit the entrance and storage of lost mud. Another equally important factor is that a certain hydrostatic pressure must be exceeded before the formations will take mud.

Knowledge of the type of loss zone, its formation-fluid pressure, and the hydrostatic and mechanical pressures to be imposed are essential to consideration of the problem.

Three formations . . . The formations which can take whole mud can be grouped under three headings: (1) cavernous and open-fissured formations, (2) coarsely permeable formations, and (3) faulted, jointed, and fissured formations.

Cavernous and vugular beds, reefs, gravels, and other coarsely permeable formations are generally single sedimentary units and the geologic correlations of circulation losses in wells to such zones within a field, or even within a province, should be quite exact. Old weathered surfaces, such as that of the Devonian in the northern Canadian plains, also provide correlatable loss zones.

Faulted and fissured zones are, however, structural in origin and can extend across several stratigraphic units. **In those fields where the loss zones in wells have no pattern and are scattered both areally and in section, mud loss to fissures can be assumed.**

In coarsely permeable zones the circulation of the conventional fiber and flake lost-circulation materials as a treatment very frequently gives disappointing or no results. However, gravels and similar coarsely permeable loss zones are rare in the subsurface and serious losses are generally to formations with openings of relatively large size.

Author is with Shell Oil Co., Houston. From a paper presented at A.P.I. Division of Production meeting, Fort Worth.

Faults, joints, fissures . . . Fissure systems occur in all formations—sands, shales, limes, dolomites—and are not generally confined to single beds but can extend across several.

Spinner and other surveys have established, in the Gulf Coast, that losses to fissured shales are as frequent as losses to fissured sands. Fissure systems are structural in origin rather than sedimentary. Fields are known where fissure loss zones are related to axial faulting and flank wells have little trouble.

The writer's consideration has suggested that the crust of the earth in many fields is faulted, jointed, and fissured; and that such fissures are impermeable (will not take mud) at certain pressures, but will open and take whole mud when a critical hydrostatic pressure is exceeded.

Losses to fissures vary greatly in occurrence. Sometimes a half pit of mud is lost rather suddenly, but drilling can continue with no further loss. In Gulf Coast wells, using high-gel-strength muds, losses of mud to formation have been noted as circulation was started after trips. After two or three circulations which reduced pressure on the formation by breaking the gel of the mud, the lost mud has returned to the system.

Shallow losses . . . Frequently, when the shallow formations are broken down, i.e., the joints and fissures are opened, the losses are extreme enough so that the largest concentrations of lost-circulation materials will not plug them and recourse is made to such a plug as oil-bentonite.

The shallow formations are drilled in big hole with generally high drilling rates, and mud velocities in the annulus are low. It is possible to pack off the bit in a soft formation because the circulation does not properly clear the cuttings.

Formation-fluid pressure . . . A normal-pressure reservoir is one with a pressure which is equal to the pressure of a water column to the surface. Most Gulf Coast reservoirs are under a normal salt-water column pressure and have a depth-pressure gradient of 0.465 psi. per ft. Many West Texas fields and those in the foothills belt of Canada are also generally normal.

It is also known that the Spraberry fields of West Texas, many Mid-Continent fields, and those of the Canadian plains have subnormal pressures with gradients ranging from 0.24 to 0.38 psi. per ft.

Commonly used muds have densities ranging between 9.5 and 10.5 lb. per gal. with pressure gradients from 0.494 to 0.546 psi. per ft. of depth.

A normal-pressure sand at 10,000 ft. in the Gulf Coast will have a pressure of about 4,650 psi. If a low-gel mud is in use and there are sufficient drilling clearances, e.g., 4½-in. drill pipe in 9⅞-in. hole, an overbalance of 300 to 400 psi. is adequate. Thus, a 9.7-lb. per gal. mud can be safely used.

In southern Oklahoma, some reservoirs have pressures with a subnormal gradient of approximately 0.37 psi. per ft., or a reservoir pressure of 3,700 psi. at 10,000 ft. The ordinary well drills the deeper zones with an overbalance of up to 1,240 psi.

Because there is frequently a lost-circulation problem, lower mud weights could be used as even a weight of 7.9 lb. per gal., would provide an overbalance of 400 psi.

Mechanical pressures . . . The extent of the measured pressure surges are best realized in terms of increased mud density. Rapid running in of the drill pipe gives surges equivalent to an increase in mud weight of 1.3 lb. per gal. Spudding with the pump running gives surges equivalent to an increase in mud density of 2.3 lb. per gal.

When the pump was kicked open to start circulation, surges equivalent to an increase of 0.36 lb. per gal. in mud density were noted, as compared with the pressure when the pump was opened gradually.

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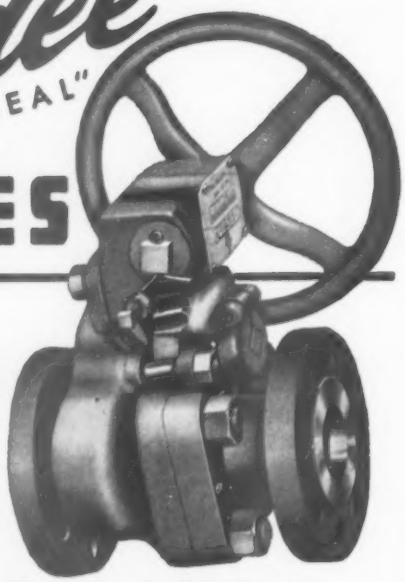

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O-12

Applications of Outdoor Metal-Clad Switchgear—3

by E. R. Hoyle

AT the present time in Marcus Hook, another 13.2-kv. outdoor unit is being installed and is expected to be in service in the near future. It consists of two incoming line sections, three transformer sections, one feeder section, and two auxiliary sections. Auxiliary sections are for utility metering and automatic transfer relays and potential transformers.

Automatic transfer of the incoming circuits is required by the utility as they would not allow parallel operation until total load on the feeders reached a capacity of 12,000 kva. There are two preferred incoming circuits which will feed two separate sections of switchgear, and an emergency line which is tapped to the existing substation and will have a tap to substation now being installed. Proposed electric-load requirements for coming year will be such that parallel operation of the feeders can be effected.

An expansion program now under way at the Houston refinery will include two new substations: one a 69 to 12-kv. station with three 12,500 kva. transformers; the other a 12 to 2.4-kv. station with three 5,000-6,250 kva. transformers. These stations should be in operation by the latter part of this year.

In 1952 at the Wood River refinery, Hartford, Ill., a 2.4-kv. outdoor metal-clad switchgear unit was installed, consisting of one transformer section and five feeder sections. The transformer section has overcurrent and differential relays, an ammeter, and a voltmeter for bus voltage indication. The feeder sections have overcurrent relays, an ammeter, and watt-hour meter. This switchgear is fed from a transformer owned by the local power company. See Fig. 1.

All power circuit breakers are of the oil-immersed type with suitable interrupting capacity and are d.c. operated. Near the substations new or existing buildings house 125-volt control batteries, spare circuit breakers, test racks, and other accessories.

Author is electrical engineer, Sinclair Refining Co., East Chicago, Ind. Paper presented at A.I.E.E. meeeting, Kansas City, Mo.

The installation of outdoor metal-clad switchgear was found to be lower in cost than other types of outdoor substations in the 13.2 and 2.4-kv. ranges. Considerable time was saved on actual installation, which is an important factor during a refinery construction program. Manpower requirements run approximately 35 to 40 per cent less than for other types of outdoor installations. The fact that outdoor switchgear requires no buildings is itself a major consideration. Switchgear near process units is located at least 100 ft. from areas designated as hazardous.

Corrosion Not a Serious Problem

Corrosion does not seem to be a serious problem. For example: the substation in the stills area at East Chicago was installed adjacent to an existing indoor substation. The refinery is crowded for room, and there is a fairly large cooling tower —with 18 fans on it—less than 50 ft. from this particular station. On some days in the winter, we get such a fog over the cooling tower and surrounding area that it is virtually impossible to see the substation. This switchgear has been operating under these conditions for the last 5 years. Yet so far, we have had no difficulty from corrosion or dampness. All the outdoor metal-clad switchgear units are equipped with space heaters to keep the inside temperature a little above that on the outside. This protection is a Sinclair requirement.

The refinery at Corpus Christi is probably subject to worse conditions than any of the other plants. The neighbor across the fence is an alkali plant. Nearby is a large cement mill which has given us considerable trouble, and on the other side is a chemical plant. Salt air permeates the entire area. We use a water-spray system to wash the insulators once each day on the 69-kv. section of the substation.

The maintenance department personnel was at first apprehensive at the prospect of having to service this type of equipment during winter months. Now, after 5 years' operation at both East Chicago and Marcus Hook, the department has expressed a preference for the outdoor metal-clad equipment. Thus far, the major portion of maintenance has been on the painting of the outside housings. A good coating which would eliminate the need for painting is desirable for saving man-hours in the refinery. Perhaps such a coating will eventually be developed by the switchgear manufacturers. Operation to date of switchgear has been reliable in every respect, except for a few minor adjustments at the time of installation.

Fig. 1—Sinclair installation at Wood River refinery.

EQUIPMENT MEN . . . in the News

Marlow Appoints Galland As District Engineer

Marlow Pumps, of Ridgewood, N. J., manufacturer of self-priming centrifugal pumps, has announced the appointment of William E. Galland as district engineer for northern California. Galland will make his headquarters in the Sacramento area.

Prior to his association with Marlow Pumps, Galland was employed by several pump manufacturers in an engineering capacity. Like all Marlow district engineers, Galland has recently finished a 6-month intensive training course at the Marlow plant, extending from assembly to engineering design and application.

Ratzer Named Vice President of Pyrene

Arthur F. Ratzer has been named vice president of Pyrene Manufacturing Co., Newark, N. J., makers of fire equipment, according to S. R. Baker, president and chairman of the board.

Ratzer first joined Pyrene Co., Ltd., in London in 1935. Starting as a chemist in the research department, he subsequently was in charge of chemical manufacture, served as assistant to the chief engineer, and later became manager of CO_2 division, and manager of the foam division.

In 1950, he joined the parent company in America as manager of the foam engineering department. Since February 1953 he has been executive assistant to the president. He is also president of Chemical Concentrates Corp., makers of fire-extinguishing compounds.

OPW Names W. D. Boone as Engineering Vice President

Wallace D. Boone has been appointed vice president, engineering, of OPW Corp., Cincinnati, manufacturers of valves, fittings, and assemblies for handling hazardous liquids.

Boone has been with OPW since 1949 and has occupied the office of chief engineer in charge of product development, research, testing, and design since 1951.

Century Appoints Officer To Canadian Subsidiary

P. I. BEDIZ

Pertev I. Bediz has been appointed vice president of Century Geophysical Corp. of Canada, according to an announcement by Ben F. Rummerfield, executive vice president of the company, a wholly owned subsidiary of Century Geophysical Corp., Tulsa. Bediz attended University of Istanbul, Turkey, and is a graduate of Colorado School of Mines where he received his geological engineering and master of geophysical engineering degrees. He was awarded a teaching fellowship at Massachusetts Institute of Technology where he did graduate work on his doctorate degree.

Bediz has spent 13 years in seismic work throughout the United States and Canada. He has served as a geophysicist in Turkey for the Turkish Government as well as a geological engineer for the ECA special mission to Turkey.

For the past 2 years he has served as supervisor and chief geophysicist in Century's Tulsa office, the position he held previously in the Canadian division in Calgary.

Baash-Ross Regional Sales Group Hears Mehrens

Under the direction of Cecil Laws, district manager for Southern Mid-Continent operations of Baash-Ross Tool Co., and assisted by "Ink" Wotkyns, vice president in charge of Mid-Continent operations, Baash-Ross personnel from various offices in the Gulf Coast area gathered recently in Houston to develop regional sales activities for 1954. A highlight of the meeting was a luncheon address given the group by Kenneth Mehrens, purchasing agent for Superior Oil Co., Houston. Shown are, front row: C. M. Laudermilk, Glenn Huckabay, "Zeke" Browning, Wotkyns, and Ken Jones. Back row: Albert Schoettler, Bob Brenner, Fred Frederick, Mehrens, Laws, and George Cook.

Oilwell Announces Eastern Area Personnel Changes

Heading the list of recent personnel changes announced by C. H. Maynard, eastern area manager for U. S. Steel's Oil Well Supply Division, was the promotion of Jon S. Blyth to assistant manager of the eastern area.

In his new position, Blyth moves to the area headquarters at Columbus, Ohio. He has been manager of the area sales office at Pittsburgh since he joined Oilwell in 1943.

A. R. Nutter, office manager for the area offices at Columbus, was named to succeed Blyth at Pittsburgh, and G. A. Yount, of the area office staff, was promoted to the post of area office manager.

Nutter is a veteran of almost a quarter of a century with Oilwell, starting in 1929 as a salesman at Charleston, W. Va. He subsequently served as district manager at Mount Pleasant, Mich.,

and Olney, Ill., before his appointment as area office manager.

Yount was employed by Oilwell in 1945 at Clay City, Ill. He served at various locations in Illinois and Indiana before transferring to the Columbus offices.

James E. Goff has been named field representative at Salem, Ill. Prior to his new appointment, he was manager of Oilwell's branch store at Centralia, Ill. He joined the division in 1938.

James E. McCaffrey, field representative, has transferred from Pikesville, Ky., to Parkersburg, W. Va. He was employed by Oilwell in 1943, and since that date has held sales and managerial positions in the eastern area.

McBurnette Joins W. C. Norris Sales Staff

McBURNETTE

R. E. (Mac) McBurnette has joined W. C. Norris, Manufacturer, Inc., as Tulsa salesman, according to E. C. Bolger, Norris president.

For the past 4 years McBurnette represented the Axelson Manufacturing Co. in Kansas with headquarters at Great Bend.

Timken Appoints Preston To Houston Sales Post

Timken Roller Bearing Co. has announced that Ralph W. Preston has been appointed sales engineer with headquarters at Houston. Recently, Preston has been engaged in metallurgical investigation for Timken Steel & Tube Division. He is a graduate of University of Kentucky.

Wolverine Tube Opens Kansas City Sales Office

Sales offices for Wolverine Tube Division of Calumet & Hecla, Inc., have been opened in Kansas City, Mo. This move was announced by E. J. Campbell, midwestern sales manager for Wolverine.

The new offices, in the Broadway-Westport Building, will become sales headquarters for sales representative Thomas E. Goodyear.

Magcobar Finishes First Phase of Sales Training

The first phase of a sales-training program that will eventually be offered to all Magcobar field service engineers was recently completed in Houston's Lamar Hotel. Frank Carson, personnel director, and Joe Webster, assistant general sales manager, conducted the meetings. Division managers and other Magnet Cove officials who attended the first meeting are, front row: Jim McLaurin, New Orleans; K. L. Byerly, Houston; Frank Carson; William M. Johnson, president of Magcobar; George Moore, general sales manager; Joe Webster; Frank Loe, executive assistant to the president. Back row: Ed Lancaster, assistant general sales manager for engineering; Sid Lindley, sales manager for Permian Mud Service, Hobbs, N. M.; Hugh Munn, president, Permian Mud Service, Midland, Tex.; Ed Taulbee, Olney, Ill.; Wally Fraser, Denver; Fred Parker, Calgary, Alta., Canada; and Murray Moffatt, Fort Worth.

Mid-Continent Promotes Skinner to District Post

W. G. SKINNER

President Ken W. Davis, of Mid-Continent Supply Co., recently announced the promotion of W. G. Skinner to district machinery manager for the organization in Tulsa.

Skinner was formerly sales engineer for Mid-Continent in Midland, Tex., and has worked for the organization in Edmond and Pauls Valley, Okla.

Rockwood Names Knapp As Sales Engineer

William J. Carroll, president of Rockwood Sprinkler Co., recently announced the appointment of Donald A. Knapp to sales engineer for the portable fire-fighting equipment division.

Knapp holds a bachelor of science degree in electrical engineering. He attended University of California and Stanford University where he pursued graduate work in communications and law.

In 1941 he was employed in the insurance department of Bethlehem Steel Co., where he undertook such duties as determining specifications of equipment purchased for fire protection, developing of fire-department training programs, and testing of new or specialized types of fire protection equipment.

Knapp's territory will cover New York and northern New Jersey.

National Supply Opens Big Spring, Tex., Store

The National Supply Co. has opened an oil-field supply store at Big Spring, Tex., to better serve drillers and producers in the area. The company has 27 other stores in Texas.

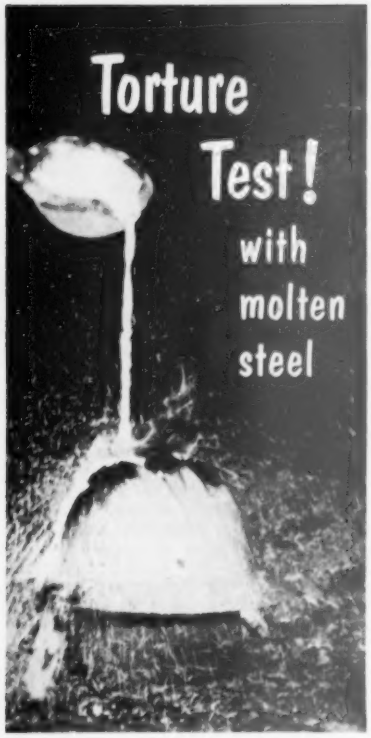
B. D. Pounds, formerly manager at Monahans, Tex., has been appointed manager of the store. It is under the supervision of C. P. Triplitt, district manager of the Odessa district.

The new store is completely stocked with machinery and equipment for operators in the Big Spring and Coahoma fields, in Howard, Borden, and Mitchell counties.

Armour Lab to Include Petroleum Research

Laboratory facilities of Armour & Co.'s chemical division have been expanded to include a petroleum-research section. This addition is the result of increasing use of the company's fatty acids and fat-derived chemicals by the petroleum industry.

The new petroleum group will be headed by Dr. L. L. Bott, with efforts in the direction of further use of fatty acids and derivatives in primary and secondary oil recovery. Laboratory and field tests will also be carried on in the development of new products for this industry.



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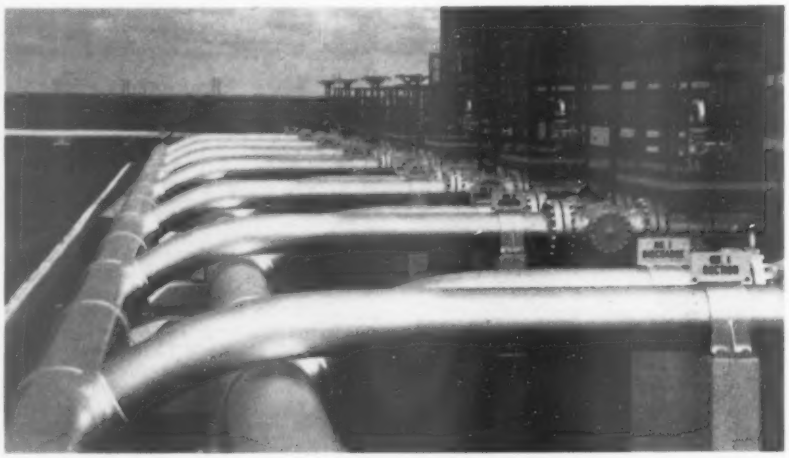

Manifold Marking Aids Operators

THE labeling of station suction and discharge lines at Tennessee Gas Transmission Co.'s new Station No. 9 at Bloomington, Tex., will aid operators in the proper identification of valves during manifold lineup changes. Numerous companies have adopted marking methods similar to that shown and have found it a simple answer to the problem of eliminating operating miscues.

Under Way, Contracted, and Planned . . .

PIPE-LINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipe-line companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the company name.

Crude-Oil Pipe Lines

• **California - Oregon Pipe Line System**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

• **Cities Service Pipe Line Co.**—60 miles, 12-in., begin March 1954, Sour Lake, Tex. to Houston, Tex.

Gulf Refining Co.—63 miles, 8-10-in., under way, Lea County, New Mexico, to Anderson and Denton fields. Completed.

• **Magnolia Pipe Line Co.**—208-mile, 20-in. crude line planned from Corsicana to Magnolia's refinery at Beaumont, Tex. Work expected to start during second quarter of 1954 with completion set for 6 months. The line will cross the Trinity River 10 miles south of Oakwood and will pass near Crockett, Livingston, and Sour Lake.

56 miles, 8-in., contracted, Seminole, Tex., to Gladiola Junction, N. M. Completed.

• **Orchard Pipe Line Co.**—45-miles, 8-in., proposed to transport crude from Masters field in Logan County, Colorado, to point 4 miles northwest of Orchard. Estimated cost: $811,250.

• **Pasotex Pipe Line Co.**—153 miles, 10-in., under way, Snyder to Wink, Tex. Completed.

• **Pawnee Pipe Line Co.**—35 miles of 10, 8, and 6-in. line proposed from Adena field in Colorado to Merino, Colo.

Phillips Pipe Line Co.—18 miles, under way, gathering lines, northeast area of Andrews County, Texas.

• **Progress Pacific Pipeline Co.**—1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles, Harbor, Calif.

• **Roosevelt Oil & Refining Corp.**—22 miles, 4 and 6-in., planned St. Helen to Norwich, Mich.

• **Sinclair Pipe Line Co.**—20 miles, 12-16-in., planned, Monee to Blue Island, Ill. Completion date 4-54.

• **Sioux Pipe Line System.**—Under study by Shell Pipe Line Corp. for group of 12 Williston basin producers. Length of line, pipe size, and terminal point pending final report by Shell.

Texas New Mexico Pipe Line Co.—52 miles, 10-in., under way, Dawson County to Basin System. McVean & Barlow. Completed.

Texas Pipe Line Co.—65 miles, 4-6-8-12-in., under way, South Louisiana. Panama-Williams. Completed.

Golden Meadow to Houma, La. Panama-Williams. Completed.

Gathering lines in Leeville, Bay De Chene

Pipe-Line Patrol

and Golden Meadow pools. Panama-Williams. Completed.

• **West Coast Pipeline Co.**—960 miles, 24-26-in., planned. Wink, Tex., to Norwalk, Calif. $106,000,000.

Products Pipe Lines

American Pipe Line Co.—Line planned from Gulf Coast area to New York City area.

Badger Pipe Line Co.—215 miles, 8-10-12-in., begin Spring '54, East Chicago, Ind., to Madison, Wis. (Joint project of Cities Service Oil Co., Sinclair Pipe Line Co., Pure Oil Co., and The Texas Co.)

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Frontier Ref. Co.—215 miles, 6-in., planned, Cheyenne, Wyo., to North Platte, Neb.

• **Great Lakes Pipe Line Co.**—Planned, extension 130 miles, 8-in., Nebraska City to Grand Island, Neb. To start March 1954.

150-miles, 8-in. to run from Iowa City, Iowa to Prophetstown, Ill., and to tie in to the Badger system there.

Harbor Products Systems—86 miles, 16-in., under way, Woodbury Junction, Philadelphia to Trembley Point, N. J. Construction Service Co. and H. C. Price Co. (Joint ownership of Sinclair Pipe Line Co., Gulf Refining Co., and Texas Pipe Line Co.) Completion date 1-54.

• **International Pipe Line, Inc.**—132 miles, 8-in., proposed, Wrenshall to Minneapolis, Minn.

Oklahoma Mississippi River Products Line, Inc.—475 miles, 12-in., under way, Duncan, Okla., to West Memphis, Ark. Ford, Bacon & Davis Const. Corp.

Under way, White River to Allen, Okla River Const. Co. Completion date 6-30-54

Under way, Allen to Duncan, Okla. River Constr. Corp. Completion date 6-30-54.

• **Phillips Petroleum Co.**—54 miles, 6-in., planned, Goldsmith to Borger, Tex.

52 miles, 10-in., planned, Shell's Brookshire system to Sweeny, Tex.

• **Triangle Pipe Line Co.**—560 miles, proposed, Arkansas City, Ark., to Covington Ky., and Nashville, Tenn.

U. S. Gov't. Alaskan Products Pipe Line.—600 miles, 8-in., under way, Haines northward through British Columbia and Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Const. Co. Completion date 9-55.

Williston Basin Pipe Line Co.—250 miles, 8-in., planned, Laurel-Billings, Mont., refineries to Glendive, Mont.

Wolverine Pipe Line System—200 miles, 14-in., under way, Chicago-Toledo-Detroit. (Joint ownership of Shell, Texas, and Cities Service.) Anderson Bros. and Midwestern Constructors, Inc. Completion date 1-54.

East Chicago, Ind., to Kalamazoo River. Midwestern Constructors, Inc.

Yellowstone Pipe Line Co.—(Continental Oil Co., Interstate Oil Pipe Line Co., Union Oil Co., and H. Earl Clack interest) 540 miles, 10-in., under way, Billings, Mont., to Spokane, Wash. 9-54.

Billings to Bozeman, Mont. Ross and Powers. Comp. July 1954.

Bozeman to Helena and on to Clinton, Mont. Associated Pipe Line Contractors, Inc. Completed.

Clinton to Perma, Mont. Associated Pipe Line Contractors, Inc.

Clinton to Perma, Mont. Eastern Pipe Line Fields Service Co.

Perma, Mont., to Murray, Idaho. Eastern Pipe Line Field Service Co.

Murray, Idaho to Spokane, Wash. Engrs. Limited Pipe Line Co. Total cost: $20,000,000.

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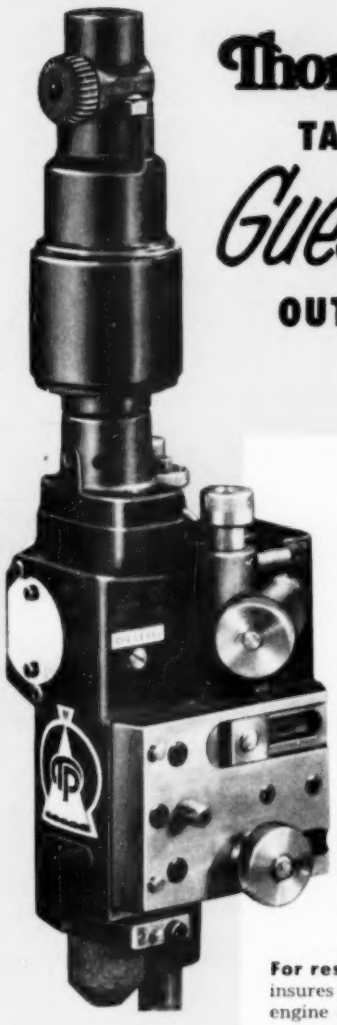
SERVICING!



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Pipe-Line Patrol

Natural-Gas Pipe Lines

• **American-Louisiana Pipe Line Co.**—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Louisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich. Estimated cost: $130,000,000.

• **Associated Natural Gas Co.**—88 miles, proposed, Missouri.

• **Atlantic Seaboard and Virginia Gas Transmission.**—116 miles, 26-in., proposed, loops along Cobb, W. Va., to near Baltimore, Md.

Buzzards Bay Gas Co.—28 miles, 8-in., under way, Hyannis, Mass., to Bourne Bridge, Mass. Hallen Co., Inc. Completion date 2-54.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Chicago District Pipe Line Co.—19 miles of 36 and 30-in., completed of 35 miles planned. Remainder, all 30-in., will be completed in 1954.

• **City of Fayette, Ala.**—20 miles, 5-in., proposed, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Ala.

City of Dallas, Ga.—56 miles of 8 and 4½-in., distribution system. Engineering & Const. Co. Start April 1, 1954.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., proposed, Green River, Wyo., to Denver, Colo. 1954.

49 miles, 20-in., proposed, Morton County, Kansas, to near Hooker, Okla.

Colorado Interstate Gas Co.—70 miles, 20-4-in., under way, gas-gathering system in Kansas. Engineering & Const. Co. 1-1-54.

243 miles, 4 to 20-in., under way, Colorado, Oklahoma, Texas, and Kansas. Engineering Const. and Z. J. Graham.

• **Colorado-Western Pipe Line Co.**—454 miles of undetermined size pipe planned between Cortez in Montezuma County and Denver. Line would serve towns of Montrose, Gunnison, Salida, Fairplay and South Platte, Colo. Estimated cost: $30,000,000. Company also plans 254 miles of laterals to service Colorado cities not now receiving natural gas.

328-mile line, proposed, to run from a point in La Plata County in southwestern Colorado over the Continental Divide along the eastern slope to serve Pueblo, Colorado Springs, and Denver. Estimated cost: $21,600,000.

• **Cumberland and Allegheny Gas Co.**—31 miles, 12-in., proposed, Garrett County, Md., to Keyser, W. Va. Cancelled.

East Tennessee Natural Gas Co.—96 miles, 16-in., under way, Knoxville, Tenn., to Kent line. Engineering & Const. Co. Completed.

54 miles, 4-12-in., under way, laterals off main line from Knoxville, Tenn., to Kent line. Engineering & Const. Co. Completed.

• **El Paso Natural Gas Co.**—1,178 miles, under way, Permian basin, New Mexico, Texas and Colorado. Spring '54.

El Paso Natural Gas Co.—771 miles, 30-in., under way, Plains, Tex., to Kingman, Ariz.

Section 1—Under way, Plains, Tex., to Corona, N. M. Oklahoma Const. Co.

Section 2—Under way, Corona to Suwanee, N. M. R. H. Fulton.

Section 3—Under way, Suwanee to Gallup, N. M. R. H. Fulton.

Section 4-5—Under way, edge to Navajo Reservation east to Flagstaff on to Kingman, Ariz. Western Pipe Line Const., Inc. Completion date 2-54.

Under way, across Navajo Reservation connecting sections 3, 4, and 5. El Paso Co. crews.

Under way, Spraberry fields, El Paso Co. crews.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Gulf Interstate Gas Co.—860 miles, 30-in., under way. Acadia Parish, La., to Boyd County, Ky. H. C. Price and Houston Contracting. 11-54.

Houston Contracting Co., Ltd., has completed 370 miles of its 500-mile contract from Rayne, La., to Kinkade, Tenn. Three spreads which have been working on the job are presently overhauling equipment and will not resume work until spring. Spread 1, headed by E. C. Norris, has completed 165 miles from the Mississippi River northward and it will resume work this spring.

Spread 2, headed by F. A. Silar, has completed 117 miles from the Ouachita River southward into the inception point of Rayne.

Spread 3, headed by M. L. Thompson, has completed 88 miles from the Ouachita River northward to the Mississippi River. It will begin work in the spring at the terminus of Kinkade, going south to join with Spread 1.

The remaining 360 miles is under contract to H. C. Price Co., Bartlesville, Okla. The firm has completed 279 miles and has 81 miles remaining which will be started in the

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Pipe-Line Patrol

spring. Five spreads, headed by G. A. Reutzel, R. L. Ezell, C. E. Shivel, C. R. Ice, and W. H. Olrich, have done the work. Price's contract covered the line between Gordonsburg, Tenn., and Catlettsburg, Ky.

Under way, Rayne, La., to Kincade, Tenn. Houston Contr. 370 miles laid. 130 miles left to be finished Spring of 1954.

Under way, Gordonsburg, Tenn., to Catlettsburg, Ky. 266 miles completed, 91 miles left.

230 miles, gathering lines, under way. Associated Pipe Line Contractors, Anderson Bros., Williams Bros.

329 miles, 12 to 24-in., proposed. Laterals off Acadia Parish, Louisiana, to Boyd County, Kentucky, line.

• **Home Gas Co.**—32 miles, 12-in., planned, Breesport to Union Center, N. Y.

17 miles, 12-in., proposed, loops from Hansock to Sanford, N. M.

Iroquois Gas Corp. and Tennessee Gas Transmission Co.—Companies planning joint storage project to be known as Colden storage field in New York. The following delivery and gathering lines are planned:

17 miles, 16-in. delivery line.

62 miles, 12, 8, 6, and 4-in. gathering lines.

• **Lateral Gas Pipe Line Co.**—27 miles, 4½ in., proposed, from Grant to Clarinda, Ia. Estimated cost: $267,200.

Lone Star Gas Co.—31 miles of 16-in. under way from Sulphur Springs, Hopkins County, to power plant near Johnstown, Red River County, Texas. Work being done by company forces.

Work will begin this month by company forces on 20 miles of 12-in. from Red Springs, Wood County, to 14-in. line connection in Smith County, Texas.

32 miles of 10¾-in. will start at Barnhart's gasoline plant in Reagan County and connect to applicant's 20-in. line in Upton County, Texas. Estimated cost $798,603.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., proposed, Doddridge, Wetzel and Marshall counties, West Virginia.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan-Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Illinois.

Missouri Central Gas Co.—25 miles, 6-in., proposed, Moberly to Macon, Mo.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

A LEADER IN PIPELINE CONSTRUCTION

SINCE 1926

24 miles, 10-in., Johnson County to Clinton, Mo.

• **Natural Gas Producer, Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **North Dakota Gas Transmission Co.**—470-mile line from Tioga plant of Signal Oil & Gas Co. and Beaver Lodge field to Fargo and Grand Forks, N. D. Line will have 78 miles of 12-in., 215 miles of 10-in., 70 miles of 8-in., and 107 miles of 6-in. Estimated cost: $10,800,000.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

• **Northern Natural Gas Co.**—Company planning 359 miles of lines for 1954; 200 miles will be main line, 139 miles will be branch lines, and 20 miles will be gathering lines. Pipe size, areas, and amounts in dollars not announced yet.

• **Northwest Alabama Gas District**—40 miles, 9-in., proposed, Southern Natural's line through Windfield to Haleyville, Ala.

Northwest Natural Gas Co.—665 miles of unannounced size pipe to bring gas from Alberta, Canada, to the "Inland Empire" of northern Idaho and eastern Washington. Estimated cost: $36,000,000.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in Lawrence, Jackson, Vinton, Hocking and Fairfield counties, Ohio.

Pacific Gas & Electric Co.—200 miles, 34-in., planned, paralleling Topock-Milpitas line. 107 miles contracted to Engineers Limited Pipe Line Co. L. E. Robertson is in charge of the spread handling work from Newberry to Danby and from Los Muertos Creek to Gilroy, Calif.

15 miles, 20-in., planned for completion in 1955 from Helm Tap to Helm Junction, Calif. Alex Robertson Co.

15 miles, 12-in., planned for completion in 1955. From Herndon to Madera, Calif. Company forces.

13 miles, 16-in., scheduled for completion in 1954. From Fairfield to Napa Wye, Calif. M.G.M. Construction Co.

30 miles, 10-in., scheduled for completion in 1954. From Corning field to Chico, Calif. Company forces.

19 miles, 16-in., from Wild Goose field to Yuba City, Calif. Scheduled for 1954 completion by company forces.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

Permian Basin Pipeline Co.—280 miles, 16-24-26-30-in., under way, West Texas and New Mexico. R. H. Fulton & Co. Completed.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

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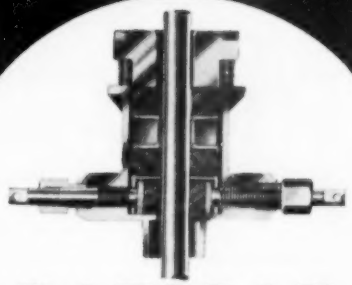

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Pipe-Line Patrol

• **Shenandoah Gas Co.**—39 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va.

• **South Georgia Natural Gas Co.**—339 miles, 2-12-in., planned, Phoenix, Alta., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee.

• **Southeast Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co. Start April 1, 1954.

Southern California Gas Co., and Southern Counties Gas Co.—73 miles, 30-in., under way, loops on main line from Blythe to Los Angeles. River Const. Co. Completed.

Southern Natural Gas Co.—1,235 miles, 24 to 4½-in., under way, Louisiana, Mississippi, Albama, and Georgia, and South Carolina. Houston Contracting, Latex and H. C. Price. Fall 1953.

Gwinville to Pickens. Completion in 1954.

Gwinville, Miss., to Ellerslie, Ga. Completion in 1954.

• **Southwest Gas Corp., Ltd.**—26 miles, proposed, from P.G.&E. line to Victorville, Calif. Completed.

• **Tennessee Gas Transmission Co.**—574 miles, 30-in., planned, Kinder, La., to Portland, Tenn.

63 miles, 26-in., planned, loops in Ohio and Pennsylvania.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U.S.-Canadian border near St. Catherines.

243 miles 24-in., planned, Coudersport, Pa., eastward across Pennsylvania, New Jersey, and New York to point near Greenwich, Conn.

• **Texas Eastern Penn-Jersey Transmission Corp.**—265 miles 24-in., planned, from Oakford Storage field in western Pennsylvania to Texas Eastern Transmission Corp.'s Compressor Station No. 26 near Lambertville, N. J. Estimated cost $30,755,000.

• **Texas Gas Transmission Corp.** — 48 miles, 26-in., planned, loops from Memphis to Slaughters, Ky.

24 miles, 16-in. line proposed from North Tepetate field, Acadia Parish, Louisiana, to South Roanoke field in Jefferson Davis Parish, Louisiana.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va.

• **Transcontinental Gas Pipe Line Corp.**—533 miles, 30-36-in., looping along Texas-New York line.

19 miles of 12.75-in. pipe starting at West White Lake field in Vermilion Parish, Louisiana, and connecting with applicant's transmission line in same parish. Estimated cost: $1,042,310.

• **Trans-Northwest Gas, Inc.**—246 miles, proposed, International Boundary near Osoyoos, B. C., to Washington and Idaho.

275 miles, branch lines.

United Gas Fuel Co., and Central Kentucky Natural Gas Co.—57 miles contracted, to Putnam County, West Virginia. H. C. Price Co.

• **United Fuel Gas Co.**—52 miles, 20-24-in., proposed, Wood County to Lanham, W. Va. Spring 1954.

57 miles, 30-in., proposed, Lanham in Kanawha County, West Virginia, to Gulf Interstate line in Boyd County, Kentucky. Spring '54.

United Gas Pipe Line Co.—44 miles, 20-in., under way, Lirette field to Harvey, La. Brown & Root.

• **United Natural Gas Co.**—50 miles, 12-in., planned, Elk County to Jefferson County, Pennsylvania. Completed.

Utah Natural Gas Co.—63.7 miles of 18-in. line completed by R. H. Fulton Co. from Clear Creek field to Orem, Utah.

40 miles from Orem to Salt Lake City will be built of 16-in. pipe at later date. Contract not let yet.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Warren Pipe Line Co.—54 miles of 4-30-in. to be completed March 15, 1954, by Western Construction Co., of Hobbs, N. M.

25 miles of 3-20-in. being laid in Garvin County, Oklahoma, by George W. Davis Co. Completion date not set.

Westcoast Transmission Co., Ltd. — (See foreign natural gas pipe lines).

Foreign Crude-Oil Pipe Lines

• **Arabian American Oil Co.**—18 miles, 22-20-in., planned, Qatif to Ras Tanura No. 3. Completion date 1-55.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products.)

Creole Petroleum Corp.—21 miles, 34-in. crude line to run from Lagunillas field to La Salina, Venezuela. Williams Brothers Overseas Co. has contract with construction slated to start in February and to be completed in 6 months. Line when completed will be the world's largest-diameter crude line.

Direccion General de Yacimientos Petroliferos Fiscales—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Estrada De Ferro Santos A Jundiai Oleoduto Santos—Sao Paulo.—This Brazilian company has completed or recently started the following lines:

2 miles, 24-in. crude line from Junction to Refinery at Capuava. Completion, May 1954.

21 miles, 12-in., planned from Cubatao to Capuava refinery. Completion scheduled for June 1954.

8 miles, 18-in., planned from Junction to power plant at Cubatao. Completion set for March 1954.

6 miles, 8-in., products line, planned from Capuava refinery to Utinga. Completion set for March 1954.

• **Gaz de France**—200 miles, 12-in. Ruhr to Paris, France.

• **Interprovincial Pipe Line Co.**—600 miles 24 and 26-in. loops, planned, along Interprovincial system between Edmonton, Alta., and Superior, Wis.

• **Mid-Saskatchewan Pipelines, Ltd.**—Proposed line from Smiley Viking oil field to connect with Interprovincial Pipe Line Co.'s Kerrobert pump station.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Ishthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

Petroleos Mexicanos.—125 miles, 10-in., under way, Jose Colomo to El Plan, Mexico.

• **Saskatoon Pipe Line, Ltd.**—56 miles, 6-in., planned, Milden to Saskatoon, Sask.

Texas Petroleum Co. — 60 miles, 4-6-in., under way. Pta. Nino de La Dorada.

• **Trans Mountain Oil Pipe Line Co.**—30 miles, 20-in. from Vancouver to General Petroleum's refinery under construction at Ferndale, Wash.

20-in. line planned from Ferndale to Burlington and a 16-in. line planned to Shell Oil Co.'s refinery under construction at Anacortes, Wash.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipe Lines

Anglo-Iranian Oil Co., Ltd.—18½ miles, 16-in., under way, Little Aden to Aden. Bech-

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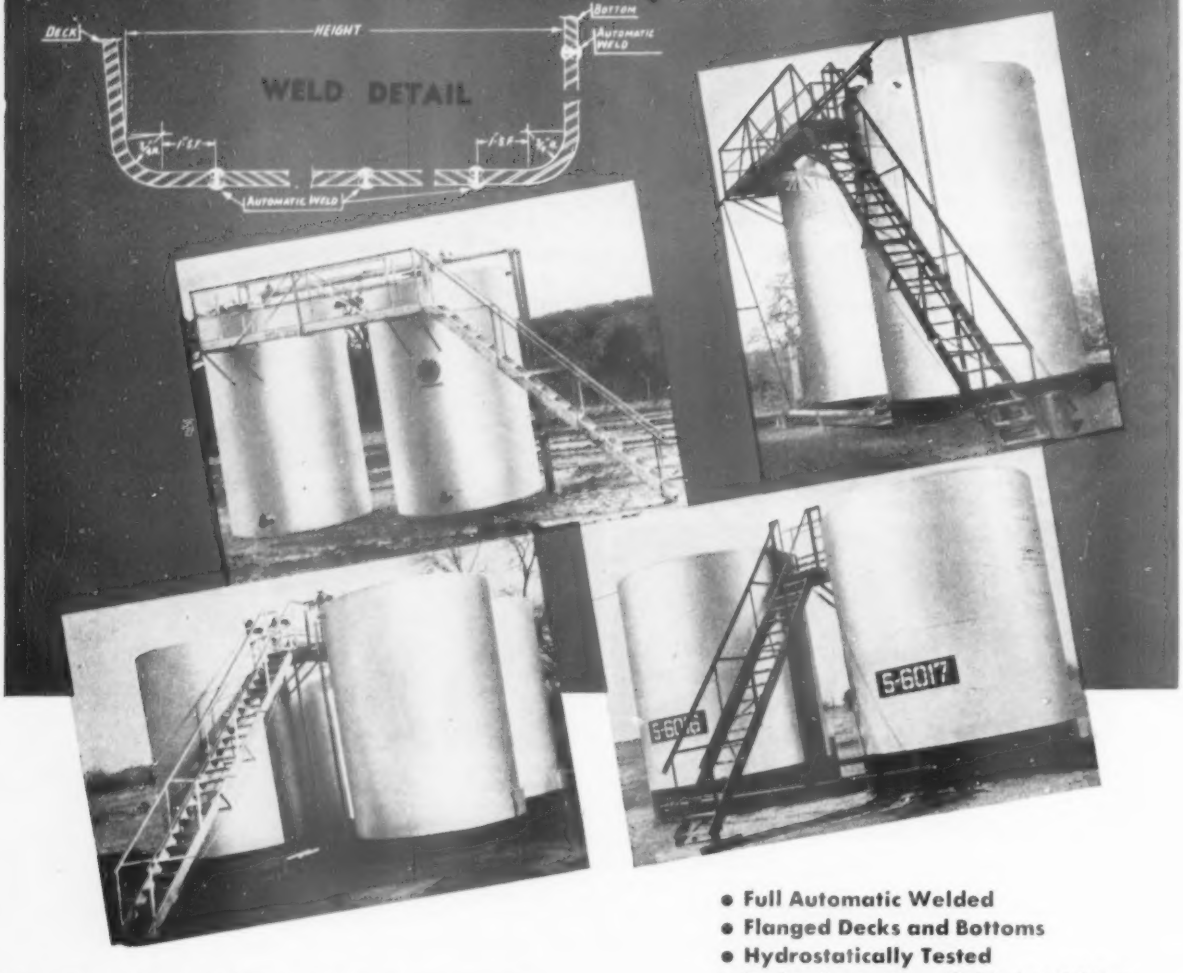

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MALONEY CRAWFORD

MALONEY-CRAWFORD TANK & MFG. CO.

FACTORY AND GENERAL OFFICE: 38 North Peoria—Box 659—Tulsa, Oklahoma.
EXPORT REPRESENTATIVE: Baird Lines, 420 Lexington Avenue, New York, N. Y.
CANADIAN REPRESENTATIVE: Maloney-Crawford Tank & Service Company, Ltd., Edmonton, Alberta.
TEXAS PANHANDLE REPRESENTATIVE: Atlas Tank Company, Pampa, Texas.

tel Corp. Completion date December 1954.

18½ miles, 6-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

15 miles, 12-in., under way, Kwinana to Fremantle, M. W. Kellogg Co. Completion date February 1955.

17 miles, 6-in., Kwinana to Fremantle. M. W. Kellogg Co. Completion date February 1955.

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO)—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line.) Contracted by Soc. Foster Wheeler Francaise.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

Foreign Natural-Gas Pipe Lines

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

Direccion General del Gas del Estado—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

• **Empresa Nacional del Petroleo** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

• **Northwest Natural Gas Co.**—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos. — 205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

Societa Nazionale Metanodotti.—This Italian company has completed or has the following projects under way. All completed jobs were finished January 1954.

53 miles, 16-in., Cremona to Porto Marghera. Montubi, Contractor. Completion May 1954.

72 miles, 16-in., Cortemaggiore to Genova. Montubi, contractor. Completion February 1954.

35 miles, 16-in., Cremona to Busto Arisizio. Sartori-Mereco-Bomar, contractors. Completion April 1954.

23 miles, 10-in., Credera to Torre Boldone. Montubi, contractor. Completed.

12 miles, 10-in., Cavaglia to Ivrea. Sartori, contractor. Completed.

10 miles, 10-in., Cavaglia to Biella. Sartori, contractor. Completed.

15 miles, 8-in., Brogliano to Schio to Piovene Rocchette. Mereco-Siedman, contractor. Completion March 1954.

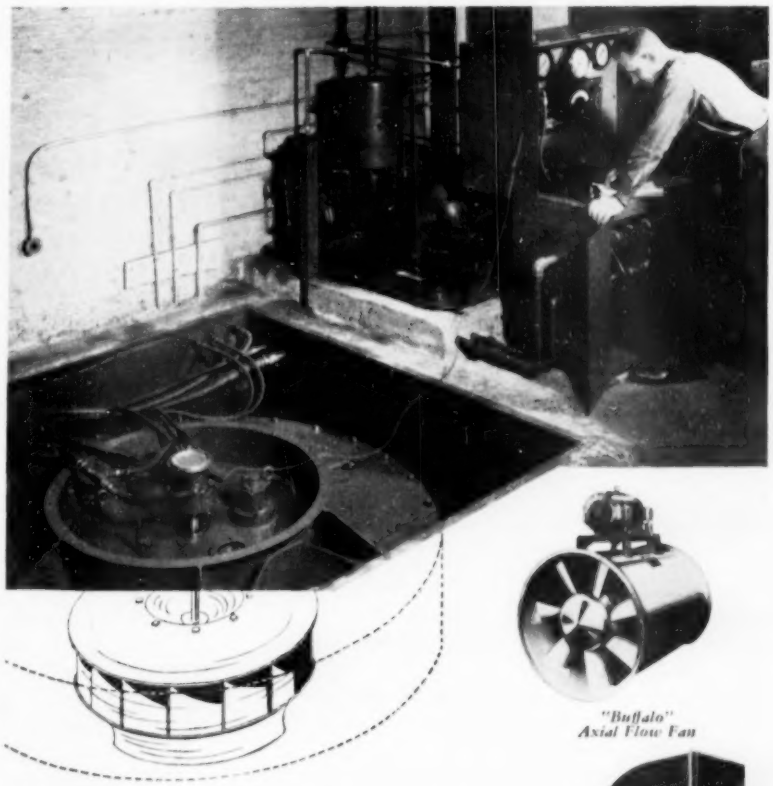
18 miles, 6-in., Bergamo to S. Giovanni Bianco. Rolle, contractor. Completed.

9 miles, 5-in., Roverbella to Mantova. Rolle, contractor. Completed.

8 miles, 12-in., Correggio to Villa Masone. Mereco-Progresso, contractor. Completed.

OUT OF THE "BUFFALO"

PUNISHMENT PIT—



"Buffalo" Axial Flow Fan

"Buffalo" Type "BL" Limit Load Ventilating Fan

COME BETTER FANS FOR YOU

To be sure that "Buffalo" rotors can stand far greater stress than they would ever encounter in an installation, we deliberately try to destroy them in this "Buffalo" vacuum test pit! Here, in a partial vacuum, the rotor to be tested can be revolved at tip speeds as high as 60,000 and even 70,000 feet per minute. The slightest unbalance, the slightest structural weakness, would result in destruction of the rotor at these fantastic speeds — and it shows up here in the Punishment Pit, not in the installed fan.

This is just one phase of the rigid testing and excellence of engineering, or "Q" Factor*, which assures you of a best buy when you specify "Buffalo" Fans. Why not write for "Buffalo" engineering literature on *your* air handling problem?

** The "Q" Factor — The built-in Quality which provides trouble-free satisfaction and long life.*

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525 Broadway Buffalo, New York
PUBLISHERS OF "FAN ENGINEERING" HANDBOOK
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HIGHLY RECOMMENDED

for low cost service

CRANE

IRON BODY—WEDGE DISC

Clamp Gate Valves

Crane Wedge Disc Clamp Gate Valves come in OS&Y, inside screw, and quick-opening patterns, all-iron or brass trimmed, screwed or flanged end. Sizes up to 4 in. Working pressures up to 150 p.s.i. saturated steam, 225 p.s.i. cold service.

Low in first cost, as well as in upkeep . . . and look at their wide utility—

Use Crane Clamp Gate Valves for steam; hot and cold water; crude, fuel, and lubricating oil; air, gas, and gasoline service.

Also in food and chemical process industries for caustic solutions, alkalies, corrosive chemicals, and gases.

You'll find Crane Clamp Gate Valves extra rugged, with a strong reinforced body and husky stem. Their compact design means a better fit for more places . . . a saving on piping in many cases. And because of the simplified clamp construction, these valves enjoy wide favor where frequent cleanout is essential. The bonnet assembly and wedge disc lift out easily—the body stays in the line. Reassembling is no problem—the bonnet joint makes up tight and stays tight.

Wide choice of regular patterns, all-iron or brass trimmed. On inside screw all-iron valves, an improved self-draining bonnet prevents entrapment of line fluids in the bonnet—protects the threads, keeps the stem working smoothly. Send for Folder AD 1667 or ask your Crane Representative for full details.

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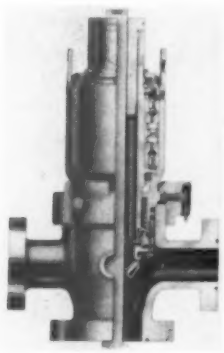
DIGEST OF NEW EQUIPMENT

IT'S NEW ✓ CHECK IT

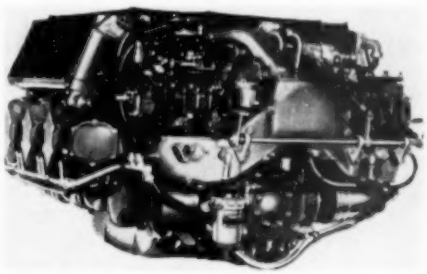
by Dan B. Miller

1 NEW PREVENTER IS IDEAL FOR SLIM-HOLE OPERATIONS. Type 51 combination rotating blowout preventer and stripper is proving ideal for blowout protection on such operations as slim-hole drilling, workover jobs, drilling-out operations, repair work and a wide range of similar drilling and production applications through casing diameters of 10¾ in. or smaller. The pressure-sealing unit consists of a heavy-duty stripper rubber which fits tightly around the drill string and prevents any pressure leakage. As well pressure increases, the stripper rubber is pressed more tightly against the drill string. The stripper rubber expands and contracts automatically as the various diameters pass through it. Also, it automatically adjusts itself to maintain a pressure-tight seal around varying shapes. When it is desired to pass abnormally large diameters it is necessary to rotate the bonnet one-sixth turn. The sealing unit rotates with the kelly thereby minimizing wear and flexing of the stripper rubber. The bearing assembly upon which the unit rotates carries the thrust loads. When sudden emergencies occur, there is nothing to operate, no valves to set, nothing to remember or forget. *Shaffer Tool Works.*



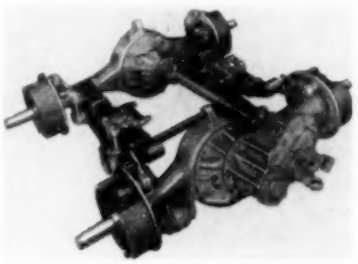
IT'S NEW ✓ CHECK IT

2 CONTINENTAL ENGINES. Availability of these military units places at the disposal of industry, air-cooled models ranging from 375 to 1,040 hp. High output, combined with light weight, compactness, versatility, and ease and economy of servicing, adapt them to assignments in several different fields. Models available include the 6-cylinder, 375-hp. AO-895-4; the 500-hp. supercharged version, the AOS-895-3; and the 12-cylinder, 810-hp. AV-1790-7, the supercharged version of which develops 1,040 hp. The extremely high power is achieved with low engine weights. Precision engineering, utilization of the latest advances in high-strength, low-weight metals, and modern design, are combined to produce these power plants. Designed for military vehicles where space is at a premium, these models take less space than conventional engines producing equivalent power. For rapid, inexpensive servicing, they have individual cylinders which are easily removed and replaced. Each of the two spark plugs in each cylinder is fired independently of the other. Dual plugs mean more efficient fuel use. The accessory case provides a convenient power-take-off shaft. *Continental Motors Corp.*



IT'S NEW ✓ CHECK IT

3 NEW MODEL 32M TANDEM AXLE has a load capacity of 32,000 lb. on the rear tires at the ground. An outstanding feature of the tandem axle is an interaxle differential. This third differential in the power divider assures equalized power transmission to the driving wheels even though wheel speeds may be variable due to road irregularities or differences in tire diameter. Tandem axles are engineered specifically for tandem operation and are not subject to the abnormal stresses or complicated lubricating problems. The single-drive line on a normal angle eliminates excess parts and simplifies maintenance. Power divider of extremely



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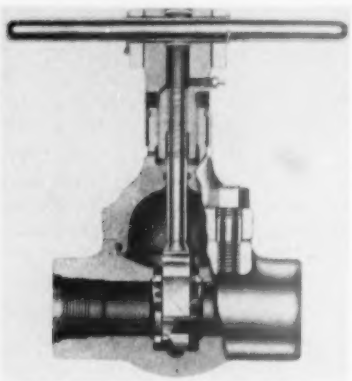
This Digest of New Equipment offers you a quick resume of important features of new or improved products and trade literature and the opportunity to obtain complete information on each subject by use of the convenient "CHECK IT - MAIL IT" service card.

simple design is an integral part of the forward axle, and assures the distribution of power equally to both axles. The design offers a particular advantage when vehicles are operated on unfavorable roads such as mud, snow, and ice, providing maximum traction at all times. This is accomplished by means of a 100 per cent positive differential lock between forward and rear axles. *Eaton Manufacturing Co.*

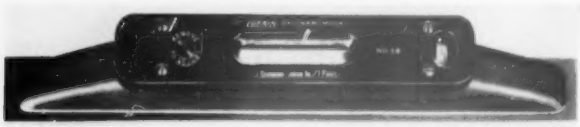
IT'S NEW CHECK IT

4 MUDWONDER, a new alloy steel mud-line valve, stops sanding up, and reduces maintenance and down time: yet, is easier and faster to operate. Its simple, self-aligning steel gate which is separate from the stem and its resilient buna-N seat insert make drop-tight closures easy. The mud-line pressure rather than the stem pressure is responsible for the seal. The open-center bonnet with a large gate opening keeps sand from collecting or packing around either gate or stem. A two-piece paddle permits use of materials specifically designed for the stem and gate. Stainless-steel stems last the lifetime of the valve. Hardened alloy-steel gates, chrome plated, resist the abrasive action of the mud. Any maintenance that may be necessary in the field can be done without disturbing piping hookups in less than 5 minutes. Easier operation results primarily from the slotted stem-gate coupling which lifts the gate vertically without bend or binding the stem. A double-thread construction giving a 2-to-1 ratio moves the gate twice the usual distance with each turn of the handwheel. All threads are completely enclosed and sealed. *Edward Valves, Inc.*



IT'S NEW CHECK IT

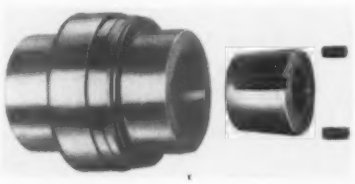
5 NEW MASTER PRECISION LEVEL NO. 59 is designed for accurate setting, erecting, and testing of machinery and surface plates. This precision level gives extra



accuracy. The ground and graduated vial is of 10-second accuracy, with one division equalling 0.0005 in. per foot. The special alloy base is less affected by temperature changes and the top plate is made of special nonconductive insulating material. Extra sensitive screws have 64 threads per inch for fine, positive adjustments. Auxiliary level shows lateral position. Machined surfaces are scraped with extreme care. Nonmachined surfaces have durable black crackle finish. This level is 15 in. long, 3 in. high, and 1½ in. wide, and weighs approximately 6 lb. It is packed in a substantial, well-finished wooden box with hinged cover. It is particularly designed for tank setting and precision equipment alignment. *The Lufkin Rule Co.*

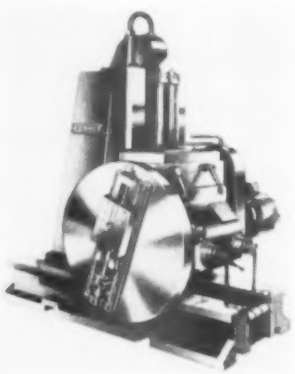
IT'S NEW CHECK IT

6 THREE SIZES OF LOVEJOY TYPE C COUPLINGS have been adapted for use with Dodge taper-lock bushings. Besides permitting easy fastening to shafting with the firmness of a shrunk-on fit, couplings adapted to taper-lock bushings permit use of a smaller number of coupling bodies taper-bored for taper-lock bushings. The three sizes of the Type C coupling which will be available for use with taper-lock bushings are: C-191 for bores ½ to 2 in., and C-226 and C-276 for ½ and 2½-in. bores. *Lovejoy Flexible Coupling Co.*



IT'S NEW CHECK IT

7 HEAVY-DUTY BORING AND FACING MACHINE is designed to face pipe and pipe flanges from 4 to 60 in. in diameter. It can also be used for back facing, boring, drilling, and tapping. Design of the head eliminates conventional overhang. The complete motor-driven unit moves directly into the work face. The design makes possible extra rigidity permitting heavy cuts with a high degree of finish and accuracy. It can be lifted, with its built-in eyebolt, and moved from place to place with ease. It can be set on bed plates in the machine shop and used to face pipe and pipe flanges as well as many other operations. Attachments are available to convert the unit to a fully automatic production profiling machine. Higher columns, longer bed rails, and special facing heads are available for special-purpose applications. A 15-hp. motor drives the unit. The model illustrated weighs approximately 15,000 lb. fully equipped. *Forney's, Inc.*



IT'S NEW CHECK IT

8 CAT D2 TRACTOR. Drawbar horsepower has been increased from 32 to 35 and belt horsepower is up to 42. Total weight of the machine has been increased approximately 525 lb. The machine will accomplish more work than a 35 to 40-hp. wheel tractor. There is 1,460 sq. in. of

RUGGED...

RUGGEDNESS is required for todays drilling conditions.

- Drum, large diameter, extra long.
- Single package draw works and transmission makes an easy to handle, rugged unit.
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These features make UNIT RIG's U-20 a RUGGED, fast operating, trouble free, rig.

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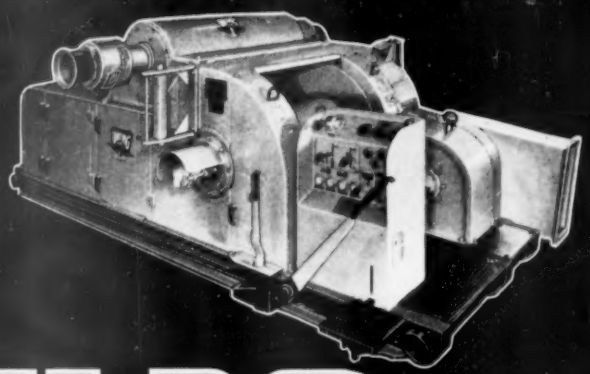

U-20

UNIT RIG & EQUIPMENT CO.
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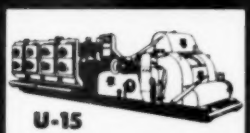
DESIGNED FOR THE JOB....

U-34

U-35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HOUSTON OIL FIELD MATERIAL COMPANY
NORVELL-WILDER SUPPLY COMPANY
AND OTHER LEADING SUPPLY STORES

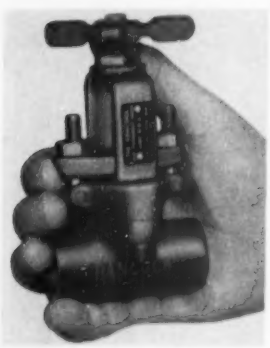
EXPORT SALES—MID-CONTINENT SUPPLY COMPANY, 42 Broadway, New York City. Cable—MIDUNITRIG

steel track to grip the ground. Over-all length has been increased 6⅛ in. and two more track sections have been added. As a result of the increased length, it is now pos-

sible to remove the flywheel clutch without disturbing the engine. The seat has also been moved forward for better access to the rear of the steering clutch case. Other improvements include a track carrier roller and heavy-duty fenders as standard equipment. Fuel-tank capacity has been stepped up from 20 to 26 gal., but the new D2 will use cheap, efficient No. 2 furnace oil. *Caterpillar-Tractor Co.*

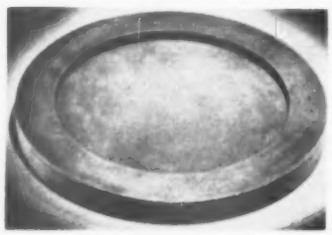
IT'S NEW CHECK IT

9 HIGH-PRESSURE INSTRUMENT VALVE. Specially designed and engineered for such services as instrument panels and lines, gage, bypass and corrosive lines, and orifice meters, the new 6,000-psi. stainless-steel instrument valve is small, easy to handle, and weighs only 2¼ lb. Its space-saving compactness permits close alignment of piping with near structures. The packing gland can be readily pulled tight in close quarters and disassembly presents no problem. Every practical use of stainless steel assures maximum protection against corrosion. Sizes available are ¼, ⅜, and ½ in. *Manning, Maxwell & Moore, Inc.*



IT'S NEW CHECK IT

10 NEW EXPENDABLE IMPERVIOUS RUPTURE DISK. This new unit has been designed as an easily replaceable, expendable, pressure-relief device for protecting closed vessels and systems carrying highly corrosive fluids and gases. It is especially suitable for applications in the chemical and petroleum-processing industries. The complete disk is machined to 0.002 tolerance from one solid piece of Impervite impervious graphite which is immune to the corrosive effects of most chemicals, features absolute zero porosity, and will not contaminate substances in process. Capable of withstanding temperatures to 325° F., rupture disks utilize the entire inside diameter of the vent line for the actual pressure-relief membrane. This feature, combined with the nonductile characteristic inherent in Impervite, permits practically 100 per cent breakout of pressure membrane to allow maximum full opening for safe escape of excess pressures. Impervite rupture disks are intended to be used between vessel nozzle and vent line. Rupture disks are available for pressures from full vacuum to 75 psi., and in nozzle diameters from 2 to 24 in. Disks designed for higher pressures and larger diameters can also be furnished on special order. *Falls Industries, Inc.*



IT'S NEW CHECK IT

11 SULFUR DIOXIDE GAS DETECTOR is an exceptionally accurate, yet easy-to-use, portable instrument for quickly determining SO_2 concentrations of 0 to 50 p.p.m. in the atmosphere of a working area. Maximum allowable concentration of sulfur dioxide gas for working temperatures is 10 p.p.m. for an 8-hour exposure. The user squeezes the aspirator bulb three times for an adequate air sample, then reads the SO_2 concentration on a graduated scale on the detector tube. The reagent in the tester tube turns from blue to white, and the length of decolorization is directly proportional to the per cent of SO_2 in the sample. *Mine Safety Appliance Co.*

IT'S NEW CHECK IT

12 SONOSORBERS. These units have inner cores encased in perforated stucco-embossed aluminum, are light weight, and are easy to clean. They are especially suited for noisy industrial locations where ordinary acoustical treatment is not applicable. They are described as volume absorbers, with absorption areas larger than their physical dimensions in certain frequencies. Being placed in the intense sound area, the physical structure tends to break up sound waves, attracting and absorbing or draining the sound due to diffraction. Sonosorbers are about 24 in. long and are hung on 2, 4, 6, or 8-ft. centers, or as desired. Sonosorbers are usually suspended in the vicinity of the noise sources. *Sonosorber Corp.*

IT'S NEW CHECK IT

TRADE LITERATURE

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13 STEAM-HOSE APPLICATIONS. Every type of steam-hose application is covered in this new four-page bulletin. The company's complete line of steam hose and their uses are described fully. Cross-section and cutaway photos show the various types of construction. Included also are performance data, sizes, and working pressures. *Quaker Rubber Corp., Division of H. K. Porter Co., Inc.*

14 TRENCHING EQUIPMENT. Inside spread of the four-page bulletin has been arranged to permit a simple, quick comparison of the digging capacity and specifications of Models 92, 95, 110, and 140, the standard machines for pipe-line trenching from 10 to 30 in. wide, and up to 5½ ft. deep. Text briefly describes specific advantages, typical job applications, and special construction features of each model. *The Cleveland Trencher Co.*

15 TRAINING FOR WELDERS. A new pictorial booklet describes the curriculum and organization of the Hobart Trade School. Courses offered include arc welding, carbon arc welding, alloy steels and cast iron, inert-gas-shielded-arc welding, hard facing, tool welding, stud welding, submerged arc welding, oxyacetylene welding and cutting, and pipe welding. *The Hobart Trade School.*

16 DAVEY SUPER CHIEF 315-500-600 C. F. M. MODELS. A new six-page, two-color booklet illustrates each model in four-wheel and skid trailer mounted units. Model 315 is included with gasoline and diesel engines. Models 500 and 600 are listed in diesel-powered units only. Complete specifications are listed along with an air requirements table for air tools. *Davey Compressor Co.*

17 VANTON PLASTIC PUMP. A new bulletin illustrates the Vanton line of "Flex-i-liner" plastic pumps. These pumps, having neither stuffing box, shaft seals, gaskets, nor internal valves, are designed specifically to handle highly corrosive fluids and abrasive slurries. The bulletin contains cutaway illustrations, diagrams, applications, operating specifications, performance data, and listings of available body block and Flex-i-liner materials. *Vanton Pump & Equipment Corp.*

18 QUIK-LIFT ELECTRIC HOISTS. A new, six-page two-color bulletin includes performance and safety features, cutaway drawings showing details of construction, together with complete specifications and dimensions of all 17 Quik-Lift models from 500 to 4,000-lb. capacities. Also in the new bulletin are pictures and descriptions of various electric hoist accessories. *Coffing Hoist Co.*

19 PNEUMATIC SIGNAL TRANSMITTER. Bulletin 9653-M illustrates and describes the pneumatic signal transmitter designed especially for use with the Hagan ring balance meter. Using a schematic diagram of the operating mechanism, the booklet explains how the speed, accuracy, and stability of the transmitter, in combination with the versatility of the ring balance meter, provide an instrument easily adaptable to an extremely wide variety of metering and control applications. These include control installations requiring automatic reset, remote adjustable set point, and derivative rate action. *Hagan Corp.*

20 PRESENTING THE ALLIS-CHALMERS LINE. The catalog has been expanded to 36 pages to include illustrated information and data on the HD-15 crawler tractor now available with a choice of two drives, standard transmission or hydraulic torque converter. Illustrated and described also along with its crawler tractors, wheel tractors, and motor graders, is the line of motor scrapers and wagons. *Allis-Chalmers Manufacturing Co.*

21 NEW SPECIFICATION BULLETINS ON P&H DIESELS. A new series of two-color bulletins covering the full line of P&H diesel engines is printed on two sides of an 8½ by 11-in. sheet, handy for filing and reference purposes. The new literature gives condensed information and specifications on this line of two-cycle diesel engines. There is a separate bulletin for each diesel with pictures of each model or engine and power unit. All models, from 20 to 138 hp., two, three, four, and six cylinders, are included in the new series. *Harnischfeger Corp.*

22 OIL-FIELD TOOLS. A comprehensive 56-page catalog shows major overshots, hydraulic jars, line wipers, and other specialties. Illustrative drawings showing construction, operation, and use of all the tools, as well as specific recommendations for use and service together with price list, are included. *Bowen Co. of Texas.*

23 MACCO GAS LIFT EQUIPMENT. Check valves, injection valves, and fluid control valves are covered with a number of drawings to illustrate construction and operation of these patented devices. *Macco Oil Tool Co.*

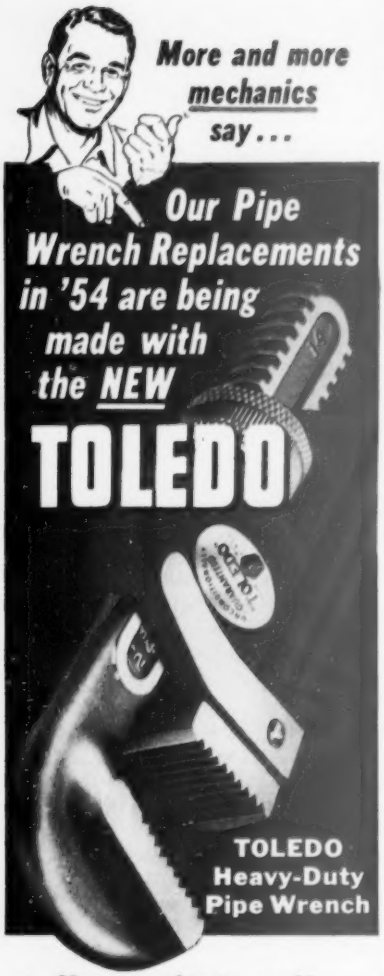
24 LISTER STATIONARY DIESEL ENGINES. Five models of 9 to 54 b.hp. with one to six cylinders (3.75 by 4.5 in.), are described in a new eight-page illustrated Bulletin 5303. Design features, specifications, and dimensional diagrams are included. *The National Supply Co.*

25 CATHODIC PROTECTION SERVICE. The 1954 52-page illustrated catalog and price list covers over 700 individual items used by the corrosion engineer. In addition to materials, instruments, ditching machines, and pipe-coating materials, there are 14 pages of technical data to assist in determining materials and current requirements in cathodic-protection installations. *Cathodic Protection Service.*

26 THE ANSWER TO MANY CEMENTING PROBLEMS, a two-color, eight-page foldout, describes the Rector Orifice Fill Shoe, a new product made in all casing sizes. The equipment reduces surge while running casing and affords a controlled, constant fill, eliminating manual fill. Cutaway drawings illustrate each step in the method and construction details of the cement head, the shoe, the collar assembly, the back pressure valve, and the two-plug stage cementer. *Rector Well Equipment Co., Inc.*

27 ATOMIC-ENERGY TESTING. A new method and equipment, described as the Gamma Rays Machine, for inspecting welds and locating hidden flaws, is described in an eight-page foldout. Illustrations show defects found in weldments and castings. *Gamma Industries, Inc.*

28 NEW LOADER LINE. The new eight-page, two-color bulletin on the Transo 1½-yd. loader employs a liberal use of photos and sketches to point out the features of the four-wheel-drive unit. The first two inside pages show the TLF-150 at work. The two center pages show the design features built into the loader. One page of the bulletin discusses the TL-100 1-yd. model. This front-wheel-drive unit also has the same dumping height, 10 ft., as does the larger 1½-yd. unit. A full page of detailed specifications is included for both the 1 and 1½-yd. units. *Le Roi Co.*



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PIPE LINE

Platte Cuts Rates

New rate schedules effective April 1

DENVER, Colo.—Platte Pipeline Co. has revised its rates for shipment of crude from Rocky Mountain fields to the Midwest, effective April 1.

Crude formerly moved from Wyoming at 40 cents per barrel will be shipped at 39 cents per barrel from western Wyoming and for 37 cents from eastern Wyoming points of origin. Prices quoted are for movement past the Wood River, Ill., terminus of Platte and into the Chicago area.

Under the new rates, Denver-Julesburg basin crude entering the line at Gurley, Neb., will move to Chicago for 35 cents per barrel, a reduction of 1½ cents from the previous rate.

New pump stations . . . Platte also announced that construction of two additional pump stations to boost the capacity of its line by 45,000 bbl. per day is ahead of schedule. One unit of each of the four-unit stations will be available for operation by April 1 providing a capacity of 120,000 bbl. per day at that time. Full operation of the new stations is expected in June.

The line is now running at approximately 105,000 bbl. per day, of which about 10 per cent is heavy, black, asphaltic, sour crude. A custom handling procedure was initiated for this type of crude a few weeks ago *(The Oil and Gas Journal, February 8, page 173)*.

Platte is the first major line to attempt batching for low-gravity heavy crudes of this type. Platte has found the operation successful and that a steady demand for this type of production exists in several midwestern areas.

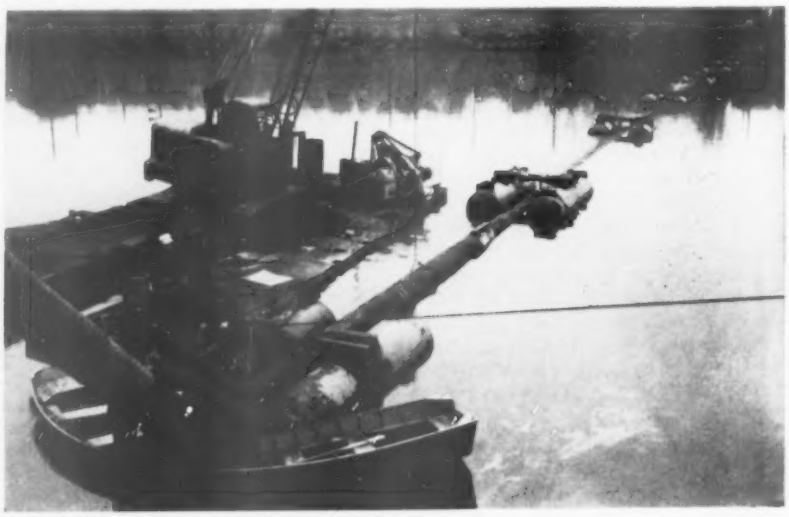
Line Contract Let

Magnolia awards work on new line to Zachry

DALLAS.—Magnolia Pipe Line Co. has let contract to H. B. Zachry Co., San Antonio, for construction of the entire 208 miles of its new 20-in. crude line from Corsicana to Beaumont, Tex.

Work is scheduled to start on the project within 60 days. It will be completed probably in September, a Magnolia spokesman said.

About 100 miles of pipe already has been delivered. About 112 miles of it will be coated at Houston by C. R. C. Engineering Co. and Mayes Brothers, Inc. The remainder will be coated over the ditch.



Floating In 16-in. River Crossing

One of the two 16-in. gas pipe lines for Philadelphia Electric Co. is shown being lowered into the Schuylkill River at West Conshohocken, Pa. This dual 16-in. crossing of the Schuylkill River provides a link in the additional transmission lines needed to supply the fast growing Delaware Valley area. Contractor is Fulghum Contracting Corp. and field inspection is done by United Engineers & Constructors, Inc.

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The new line will have a capacity initially for pumping 122,000 bbl. of crude daily to Beaumont. It will be laid on nearly a straight line from Corsicana to Beaumont, crossing the Trinity River 10 miles south of Oakwood, Tex., and passing near the towns of Crockett, Livingston, and Sour Lake *(The Oil and Gas Journal, January 18, page 53)*.

Other facilities . . . New pumping equipment will be installed at Corsicana, together with necessary tank-farm lines and two new 120,000-bbl. tanks. Six 122,500-bbl. tanks with connecting pipe lines will be built at Magnolia Petroleum Co.'s Beaumont refinery. Meter installations will be made at Beaumont so that oil delivered at the plant will be measured automatically.

Design plans for the project are such that pumping capacity of the line can be hiked to 165,000 bbl. daily by adding another pump station along the line.

Magnolia Completes West Texas-New Mexico Line

DALLAS. — A 56-mile, 8-in. crude line connecting North Denton and Crossroads fields in New Mexico with the company's main-line system in the Permian basin of West Texas has been completed for Magnolia Pipe Line Co.

H. B. Zachry Co. was the contractor on the line, which runs from the Magnolia pump station near Seminole in Gaines County, Texas, past North Denton field to Gladiola Junction in Lea County, New Mexico, where it ties in with an existing line which connects Crossroads field near Tatum, N. M. *(The Oil and Gas Journal, December 7, page 160)*.

Salvaged 8-in. lines replaced by Magnolia's 154-mile, 16-in. line between Ringgold and Corsicana, Tex., which was completed last fall, were used for the recently completed project.

Texaco South Louisiana Crude Lines Completed

HOUSTON.—Panama-Williams Co., Houston, has completed 65½ miles of crude lines for Texas Pipe Line Co. in South Louisiana.

The project included 34 miles of 12¾-in. line from Golden Meadow to Houma, La.; and 26 miles of 8⅝-in., 3 miles of 6⅝-in., and 2.6 miles of 4½-in. gathering lines in Leeville, Bay de Chene, and Golden Meadow pools *(The Oil and Gas Journal, September 28, page 168)*.

See Composite and Refinery Catalogs, or Write for Folder On

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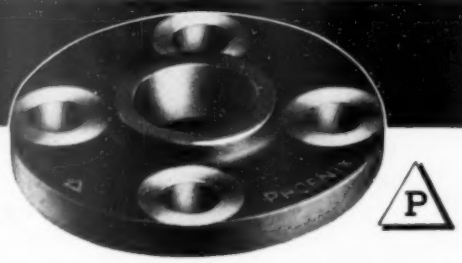

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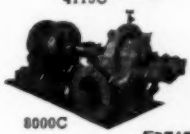
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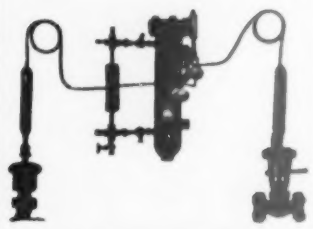

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Among the

Drilling Contractors

Delta Companies Drilling Three New Wildcat Tests

New contract jobs being drilled by Delta Drilling Co., Tyler, Tex., include a wildcat test for Sun Oil Co. at 1 Jackson Parish School Board, 5½ miles southeast of Ansley, in Jackson Parish, North Louisiana and one for Stanolind Oil & Gas Co. on its Beaver Creek unit, in Fremont County, Wyoming. The latter is projected to 12,400 ft. Delta Gulf Drilling Co. an affiliated company, is starting a new wildcat test for Sinclair Oil & Gas Co. at 1 Christena Mittel, in the West Bushy Top area, in Sutton County, West Texas.

S. H. Howell has contracted for a 6,500-ft. test to be drilled for Ginther, Warren & Ginther at 1 Ragsdale, 3 miles southwest of Taft, in San Patricio County, South Texas. Location, in the George H. Paul Subdivision, Coleman-Fulton Pasture, is a mile southeast of South Taft field.

Barnwell Drilling Co., Shreveport, has moved a rig on a previously abandoned wildcat test 3 miles northwest of Benson, in northern DeSoto Parish, North Louisiana, and will deepen the hole from its present depth of 5,248 ft. to a new projected objective, the Travis Peak, around 8,000 ft. The test, 1 Harris, in 6-10n-13w, is being deepened for Joe W. Brown and associates, of New Orleans.

New Contracting Firm To Drill in California

R. L. Parker, tool pusher for Krug Exploration & Drilling Co., and Albert Peters, lately associated with Hagestad Drilling Co., both of Bakersfield, Calif., have formed a new partnership to engage in contract drilling.

Operating as Parker Drilling Co., with headquarters at Bakersfield, they are starting with one rotary rig, recently assembled at Taft by California Commercial Drilling Co. The rig is rated for 3,000-ft. drilling with 4-in. drill-pipe.

Peters has worked in oil fields since 1923, and has been a driller since 1929. Parker also has had many years of experience in the drilling business, starting as a roughneck.

L & W Drilling Co., Mission, Tex., is moving a rig to a wildcat location 15 miles northeast of Falcon, in Zapata County, Southwest Texas, where it will drill a 6,000-ft. Queen City test

New deep-well drilling rig which Clyde Hall Drilling Co., Bakersfield, Calif., recently placed in operation in Belgian Anticline field, 50 miles west of Bakersfield. The rig, capable of drilling to 9,000 ft., has a Bethlehem M-58 draw works, a No. 450 8-by-10-in. main pump, a No. 225 8-by-14-in. standby pump, and a 17½-in. Emsco rotary table. Draw works and pumps are powered by three sets of General Motors twin-six diesel units. Rotary table is driven by a single 6-cylinder GM diesel engine. The assembly uses a Lee C. Moore 131-ft. mast.

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for Dillard & Waltermire. The test is listed as 1 Marrs McLean estate. Location is in El Javali Grant.

L. & F Drilling Co., Bakersfield, Calif., has a new contract job under way in the Goshen area, Tulare County, California. It is a wildcat test being drilled for Urich-Lowell Oil Co. Location is about 10 miles out of Visalia, in 11-18s-23e.

Field Drilling Co., San Antonio, has a new wildcat operation under way 2 miles west of Ganado, in Jackson County, South Texas. Contract is with W. Earl Rowe. The test, 3 Regina Gayle estate, is projected to 6,500 ft.

L. C. Peters Drilling Co. has a rig under contract to Byrd Oil Corp., of Dallas, for a projected 8,200-ft. test at a wildcat location 2 miles southeast of Teague, in Freestone County, East Texas. Location is for 1 Michael, in the S. B. Owens Survey.

Circle Drilling Co., Lake Charles, La., has a new contract job under way in Chacahoula field, Lafourche Parish, Coastal Louisiana. It is a projected 7,000-ft. test, 1 Levert, being drilled for Lucerne Corp., of Dallas.

Brinson Drilling Co. has a rig on a wildcat location 17 miles north of Toyah, in Reeves County, West Texas, where it is under contract for a 4,200-ft. test to be drilled for Hill & Meeker at 1 Settle. Location is in Block 55, T&P Survey.

Bankhead Drilling Co., New Orleans, is under contract for an 11,000-ft. exploratory test to be drilled for Lamson, Bennett & Cole, of Lafayette, La., on State Lease 1909, in 66-8s-1w, 4 miles south of Baton Rouge, in East Baton Rouge Parish, South Louisiana.

ACTIVE ROTARY RIGS*

Area—	Week ended 3-1-54	Change week ended 2-22-54	Change week ended 3-2-53
Gulf Coast	508	— 9	—82
N. & W. Tex.-N. M.	768	—12	—22
Ark.-N. La.-E. Tex.	185	+ 4	+77
Oklahoma	383	+10	+67
Kansas-S. Nebraska	145	— 5	—31
Illinois-Eastern	120	—13	+19
Rocky Mtns.	235	— 6	+51
Pacific Coast	144	+ 1	—19
Total U. S.	2,488	—30	—60
Western Canada	153	+10	+ 1
Total	2,641	—20	+61

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, North and West Texas-New Mexico, and Oklahoma-Kansas are shown on pages 177 and 178.

figuring out how I can be of real help to all you well diggers down Corpus Christi way. ★ In all my years of drilling and servicing oil tools, I've never found anything that worked as safe and sure as those Web Wilson Tongs—naturally with "Tiger Tooth" Tong Dies in 'em. ★ If you just can't wait till I get out to pay you a formal visit and tell you all about 'em, my name is Buckner—"Gene" for short, and a call to Corpus Christi 2-5361, or a line to Box 5306, will bring me a'flying!

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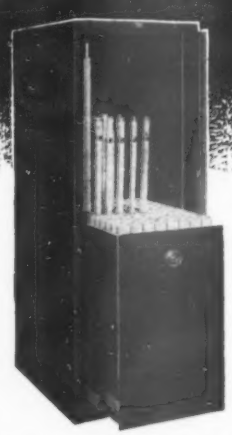

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UTAH: Vernal

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COLORADO: Artesia.

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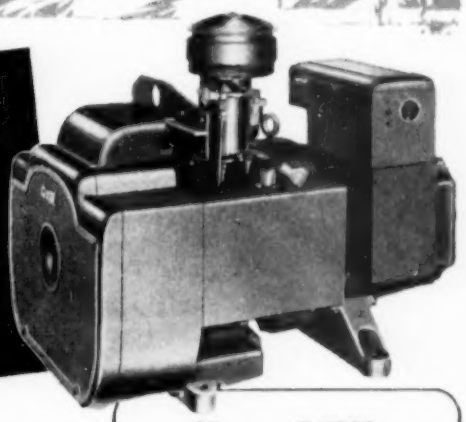

Microwave transmission is only as dependable as each of its relay links. If one repeater station cannot operate, messages do not get through.

To assure electric power for transmission, hundreds of microwave relay stations across the country are equipped with Onan Standby Electric Plants. When central station power is interrupted, the Onan plant starts automatically, supplies power for as long as the emergency lasts, then stops automatically. Controls are available to provide a time interval between power interruption and starting.

Onan Standby Electric Plants have been proved indispensable in installations serving oil and gas pipelines, utilities, railroads, TV networks, police and other government law enforcement departments.

If you have a problem in standby power for microwave radio, or any application, write our sales engineers.

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- **UNI-DUCT COOLING**—Cooling air is drawn by vacuum through generator and over engine. All heated air is expelled through one small vent which also discharges engine exhaust. Quiet operating. No liquid coolants to freeze or leak.
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REFINING

Sulfur Output Up

Petroleum industry use drops below production

NEW YORK.—The petroleum industry, through the recovery of elemental sulfur, now produces much more of that element than it consumes in the form of sulfuric acid.

Completion of new facilities for hydrogen sulfide separation from natural and refinery gases, and conversion to elemental sulfur, has boosted the industry's sulfur output from about 230,000 short tons in 1951 to an annual production which will probably exceed a half million tons this year. In equivalent sulfuric acid, this amounts to 700,000 tons in 1951 and over 1,500,000 tons in 1954.

A recent market survey completed by the Chemical and Rubber Division of the U. S. Department of Commerce showed the industry's net acid consumption as dropping below its equivalent acid output in 1952 (see accompanying table).

In 1952, the industry recovered the acid equivalent of 870,000 tons of sulfur, as compared with a total consumption of 711,000 tons in the four categories listed in the table. Additional sulfuric acid required for the synthesis of hydrofluoric acid, used in alkylation, was also consumed indirectly.

Improved recovery . . . The trend in acid consumption for aviation gasoline, in the sulfuric acid alkylation process, shows the stepped-up avgas production over the 3-year period. Improved recovery of spent alkylation acid is also reflected in the relative decline in net consumption as compared with gross usage of acid.

The decline in acid treating was reflected in the reduction of acid consumption for petroleum products other than sulfonates, from 406,000 net tons in 1950 to 333,000 net tons in 1952, despite sustained increases in total refinery throughput.

The consistent gains in catalytic cracking and reforming increased the industry's indirect consumption of acid from 123,000 tons in 1950 to 155,000 tons in 1952.

Urea Plant Planned

United Chemical to build plant at Timpson, Texas

DALLAS. — A new firm, United Chemical Co., is being formed here by Grover Hartt, Dallas oil man, to build an $18,000,000 petrochemical plant at Timpson, Tex., in Shelby County on the Texas-Louisiana state line.

Hartt, president of United Chemical, said the plant will use natural gas as raw material to manufacture about 160 to 180 tons per day of urea and anhydrous ammonia fertilizers. About 100 tons would be urea and the remainder anhydrous ammonia.

Arrangements have been made with Foster Wheeler Corp., New York, to build the plant. The French-patented Pechiney process will be used for urea manufacture and the Casale process for anhydrous ammonia production. Construction is slated to begin in 4 or 5 months and to be completed in late 1955, Hartt said.

United Chemical has options on a 166-acre plant site south of Timpson and adjoining U.S. Highways 59 and 84 and the Southern Pacific Railroad. The plant's water-supply problem was solved when Timpson citizens voted February 3 to create a water district and build a 1,500-acre lake to supply water for industry. United Chemical also has an option on a 300-acre lake site adjoining the plant site.

The new plant initially will process about 12,000,000 cu. ft. of natural gas daily and consume about 3,000,000 gal. of water per day. Firm arrangements have not yet been finalized for a gas supply, Hartt said.

Gas supply . . . Negotiations are being carried on with United Gas Pipe Line Co. United Gas' 22-in. line from the Houston area north to near Waskom passes within 100 yards of the plant site, he said. No difficulty is anticipated in lining up gas supply, Hartt said, since

ACID CONSUMPTION

(Breakdown of industry end uses of sulfuric acid, in thousands of short tons)

	1950		1951		1952	
	Gross	Net	Gross	Net	Gross	Net
Aviation gasoline	824	144	981	120	1,181	143
Petroleum sulfonates (lube oil additives)	128	63	151	81	150	80
Other petroleum products (except sulfonated hydrocarbons)	598	406	592	407	482	333
Petroleum catalysts	123	123	143	143	155	155

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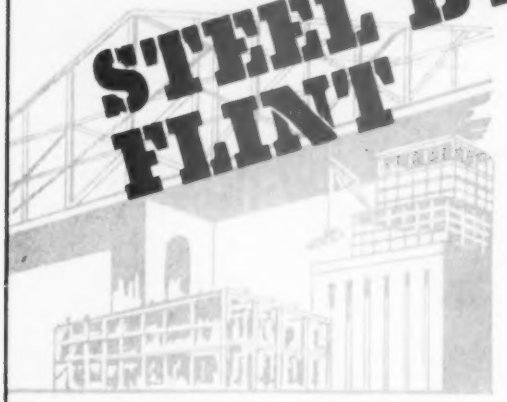

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substantial uncommitted reserves may be found near Timpson in almost any direction.

Panola field and others lie directly north of Shelby County in Panola County. There is substantial gas production in the Joaquin-Haslam area in northeast Shelby County, and other reserves lie to the south and southeast in Huxley and other fields.

Hartt said financing arrangements for the project are still in the negotiating stage and declined to identify his backers. Headquarters offices of United Chemical will be in Dallas, while the operating and sales force will be located at Timpson. Fertilizers produced at the new plant will be marketed in the general area around Timpson.

In addition to building the new urea-ammonia plant, Hartt said the company is considering construction of a natural-gasoline plant in the same area.

Largest Mass Spectrometry Technical Meeting Slated

NEW ORLEANS, La.—The largest technical meeting on mass spectrometry ever held is planned for the second annual meeting of the American Society for Testing Materials, E-14 Committee, here May 24-28.

A total of 46 papers have been offered for presentation during the 4-day meeting, on such subjects as isotopic abundance determinations, ionization potentials, solids analysis, higher molecular weight analysis, and new mass spectrometer techniques and developments.

Sinclair to Build Sulfur Recovery Unit at Houston

HOUSTON. — Sinclair Refining Co. has signed a contract with Ralph M. Parsons Co., Los Angeles, for construction of a 30-ton per day sulfur-recovery unit at its 125,000-bbl. refinery here.

The unit will be Sinclair's second. A 20-ton unit has been in operation at the Marcus Hook, Pa., refinery for several months. It will represent the sixteenth plant of its type to be engineered and constructed by Parsons.

Esso's Baton Rouge Plant Sets Man-Hour Safety Mark

BATON ROUGE, La.—Employes of Esso Standard Oil Co.'s refinery here have exceeded 6,900,000 man-hours worked without a disabling injury, besting the former record of 6,879,296 man-hours which has stood since 1942.

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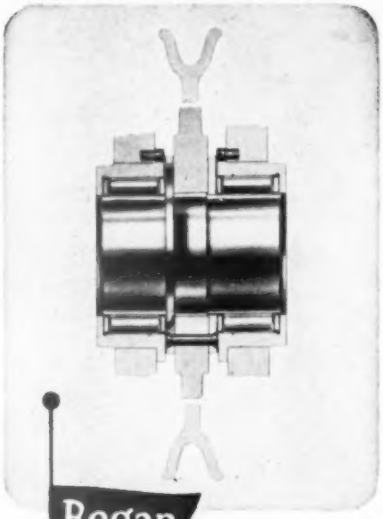

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NATURAL GAS

Transco Applies for New Natural-Gas Facilities

WASHINGTON. — Transcontinental Gas Pipe Line Corp. has proposed construction of facilities enabling it to transport a maximum of 10,000 M.c.f. of natural gas daily for Sun Oil Co. and increasing its delivery capacity to utility customers by 10,000 M.c.f. daily.

The proposal, for which an application has been filed with the Federal Power Commission, would cost an estimated $6,533,000 and would include about 57 miles of new pipe line paralleling sections of Transcontinental's existing system in Louisiana, Mississippi, and Alabama.

Transcontinental proposes to transport gas from Starr County, Texas, or some other point to be agreed upon with Sun, to Sun's Marcus Hook, Pa., refinery for 20 years beginning next November 1.

Continental Oil Contracts Newcastle Area Lease Gas

DENVER, Colo. — Continental Oil Co. has contracted for sale of gas produced from its Newcastle area leases in Weston County, Wyoming, to Wyoming Gas Products Co.

Wyoming Gas Products, owned by Murchison-Allen interests of Dallas, will construct a $5,000,000 plant in the area for gas processing *(The Oil and Gas Journal, February 22, page 122)*. The plant is expected to be completed early this fall.

Continental is the first major company in the Newcastle area to contract for sale of lease gas. Other operators contracting sale of their gas to Wyoming Gas Products include L. S. Chism of C. M. & W. Drilling Co. Trigood Oil Co. of Casper, American Liberty Oil Co., Buckhorn Oil Co., and J. D. Sprecher, Casper independent.

Total producing or apparently productive acreage covered by agreements signed to date amounts to more than 50,000 acres.

6,800 Miles of Gas Lines Approved by FPC in '53

WASHINGTON.—Natural-gas pipeline facilities to cost in excess of $725,640,000, providing for 6,800 miles of pipe line, and adding approximately 2¾ billion cubic feet of daily delivery capacity to the nation's gas transportation system, were approved by the Federal Power Commission last year.

The greater part of the expansion was approved during the first half of the year when projects calling for 4,891 miles of pipe line with a capacity of more than 2¼ billion cubic feet daily at a cost of $548,982,510 were granted certificates.

The commission reported last week that during the last half of the year it granted 87 certificates involving 1,909 miles of pipe line and nearly a half-billion cubic feet daily capacity with an estimated cost of $176,659,963.

During the year 35 certificates were issued for projects to cost $700,000 or more each, calling for the expenditure of $685,759,000 for 6,174 miles of pipe line and 539,510 compressor horsepower, with a daily capacity of 2,670 million cubic feet of natural gas.

Cadillac Natural Completes New Michigan Gas Line

REED CITY, Mich.—Cadillac Natural Gas Co.'s new 11-mile 6-in. natural-gas pipe line from Mineral Springs Stray sand gas pool, Sherman Township, Osceola County, to Cadillac, Mich., has been completed.

It is expected that gas deliveries to Cadillac industrial customers will be started about this week, with initial deliveries of about 1,000,000 cu. ft. daily.

The line was constructed for Cadillac Natural by Leuder Welding Construction Co. here. It will be leased to and operated by Osceola Refining Co. of Reed City, which owns 50 per cent of Cadillac. The remaining 50 per cent of Cadillac Natural Gas is divided among nine individuals.

Completely Automatic Dehydration Plant

High-pressure natural gas produced from gas-distillate wells in Bronte field near Bronte, Tex., Coke County, is desulfurized and dehydrated in this completely automatic field installation of Lone Star Gas Co., Dallas. The plant, about 10 miles south of Fort Chadbourne field and midway between Abilene and San Angelo, Tex., processes at capacity about 10,000 M.c.f. of gas daily before pushing the gas into Lone Star's main line between Abilene and San Angelo. The Bronte field plant was placed in operation 2 years ago.

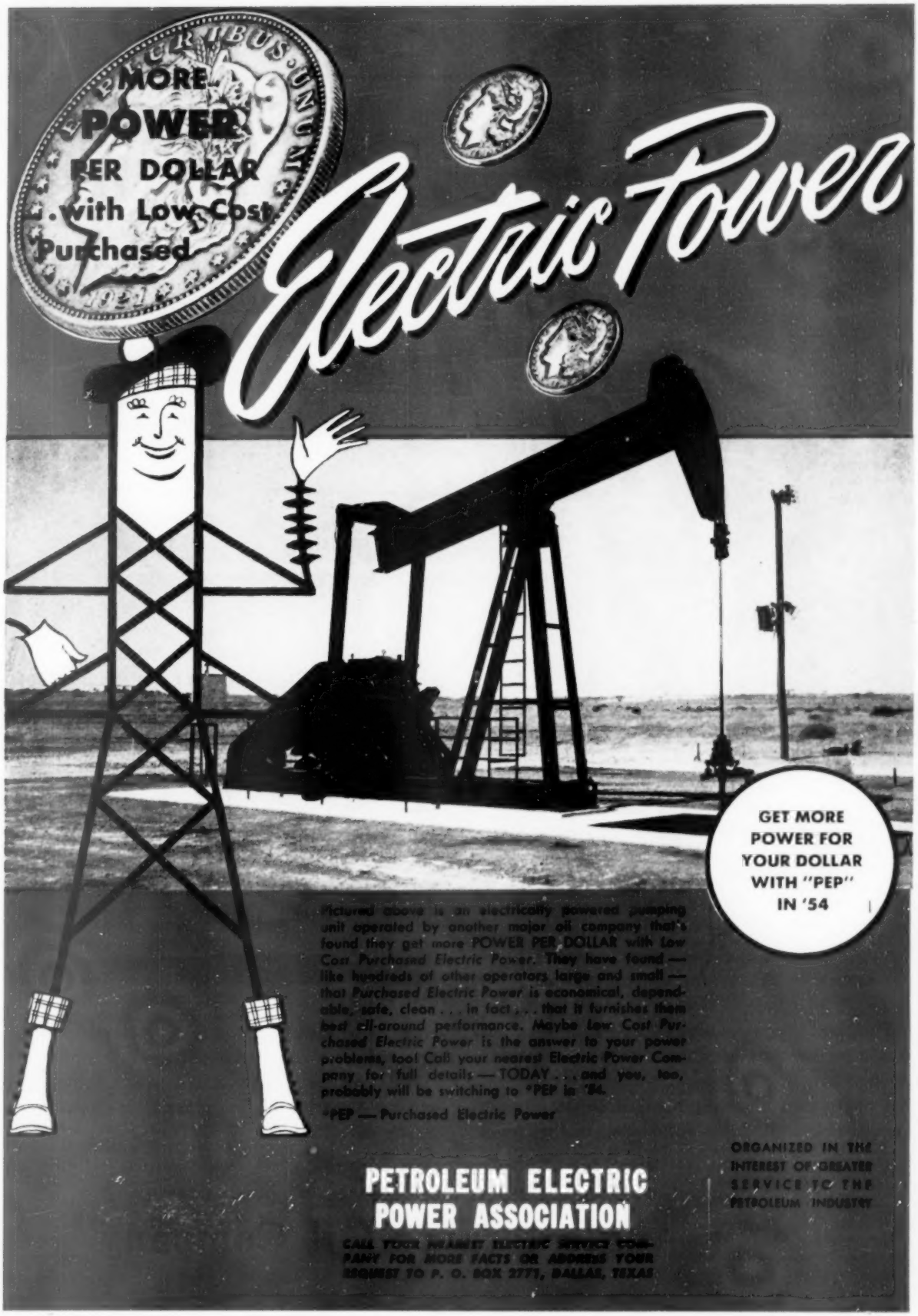
Natural Gasoline

Gulf Starts Construction Of Natural Gasoline Plant

FORT WORTH.—Gulf Oil Corp. has started construction of a new semi-portable natural-gasoline plant in Sueise field, Runnels County, West Texas.

The plant will handle a maximum of 5,000,000 cu. ft. of casing-head gas daily from Sueise pool and from the neighboring Pace area. The gas currently is being flared. The plant will be built just east of Wingate in the northwest part of the county and will be an oil-absorption type producing natural gasoline and a butane-propane mix.

Compression facilities consist of two 550-hp. units mounted, together with the rest of the plant, on skids. The gathering system comprises about 4 miles of 3 to 12-in. pipe. Residue gas will be taken by Lone Star Gas Co. through a 4-in. line it will lay to its main system in the area about 13 miles west of the plant.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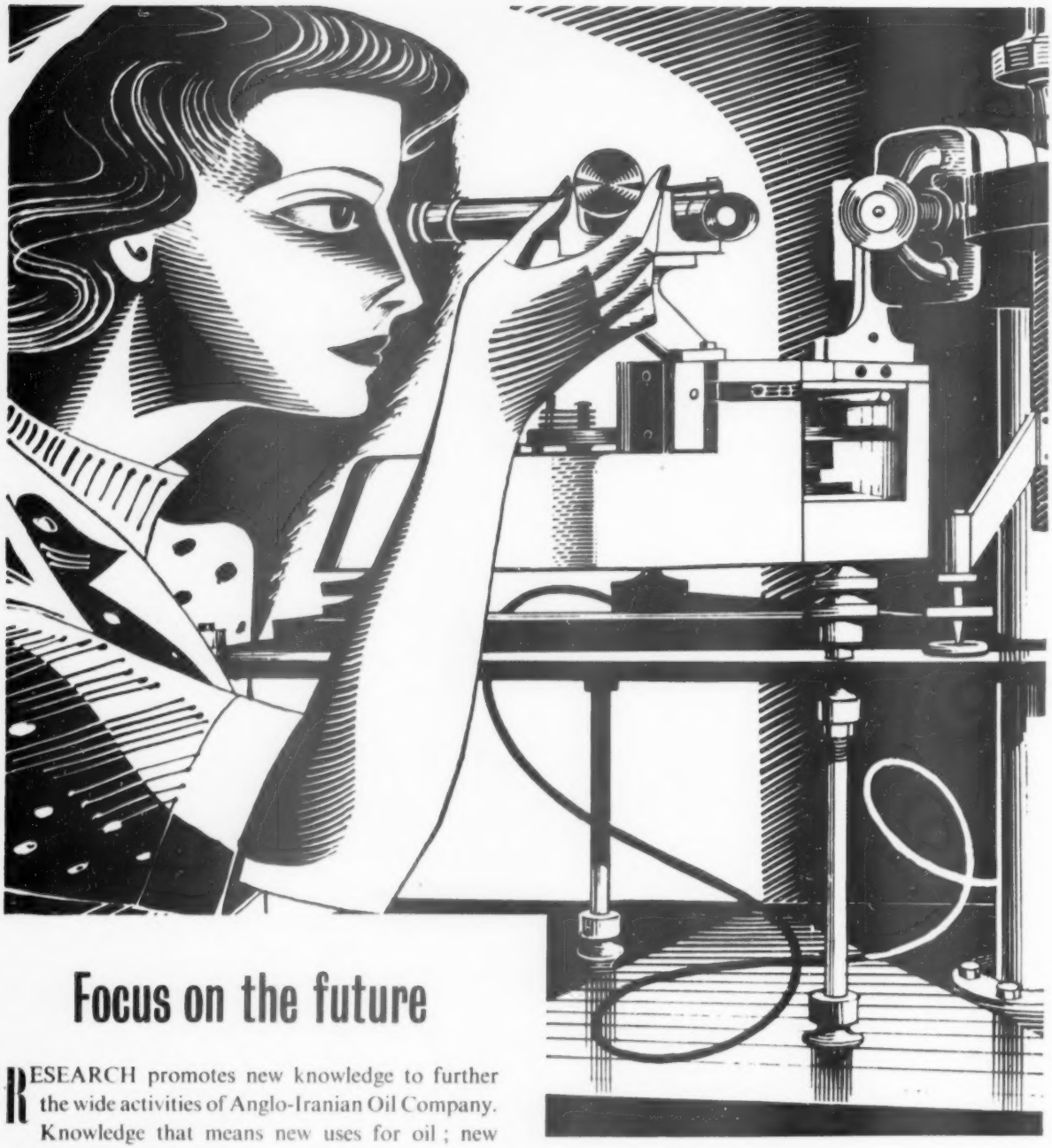

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EXPLORATION

The Impossibility of Oil in Arizona

by Frank J. Gardner

THERE is nothing quite so smug as a prejudiced geologist; and fighting against the prejudice is like fighting a shadow—you exhaust yourself without seeeming to affect the shadow at all.

Oil history is full of classic tales of geological prejudice riding before a fall—". . . there's no oil in East Texas," ". . . some shows of oil in New Mexico, but commercial deposits are highly improbable," ". . . no oil can be expected at depths greater than 3,000 ft."

Today we laugh at these old stories, and nod in silent agreement when a biased individual scoffs at the reports of oil being found in Arizona, Nevada, or Washington. It is true they may lead to no great oil field, but why condemn an area because of some preconceived objection? Successful oil exploration from this point on will depend heavily upon imagination, vision, and speculation, so let's forget our prejudices and analyze the facts. It will be a refreshing approach, and as relaxing as taking off your skin.

Recent weeks have brought reports of oil discoveries in three new states—South Dakota, Nevada, and Arizona, in that order. None are spectacular, and none may really be profitable, but all are flashing signals to exploration men—red warnings that perhaps we've been to narrow in our geological thinking. Curiously enough, all three strikes were made by the same company, a plain evidence of clear and unbiased thinking somewhere down the line.

Of the three states, Arizona seems to have more mental strikes against it than the others. Yet every sign points to the eventual discovery of commercial oil there; structures, source beds, and reservoir beds are all present in abundance, and 42 oil and gas seeps have been observed and recorded. Why should any oil man condemn Arizona?

Optimism must of course be tempered with caution. The words "possible," "probable," and "improbable," may be applied, but certainly not "impossible." A four-quarter division of the state would lead to only two categories of chance for oil: "possible" in the southeastern quarter, "possible" in the southwestern, and "probable" in the northwestern and northeastern quarters.

Major structural elements of Arizona. Arrow indicates Shell Oil Co. 1 Navajo, possible discovery well.

Not even an improbability there!

Structurally, Arizona has been divided into three principal provinces, all roughly parallel in a northwest-southeast direction. The northern part, known as the Plateau province, embraces the area north of the Mogollon rim; the heavily dissected region immediately southwest of the rim is known as the Central Mountain belt, and all of the state south and west is the Desert Basin-and-Range province. Divided this way, we can apply the terms "probable," and "improbable," and "possible" in turn.

What are the objectives in Arizona exploration? Briefly, four principal targets hold promise of oil production; the Permian (Supai), the Pennsylvanian (Hermosa and Paradox), Mississippian (Redwall), and the Devonian (Temple Butte). A fifth, the Cambrian (Tapeats), might be recorded for the northwestern Plateau, and a sixth, the Cretaceous (Dakota ?) in the southeastern Desert province.

The Devonian has yielded good showings in the northeastern corner of the state, and holds possibilities also in the northwest; the Mississippian has shown oil in the area northeast of Prescott, and the Pennsylvanian shows in Shell Oil Co.'s current wildcat confirm its possibilities. The principal shallow objective in the northeast and east-central Arizona is the Permian, with previous showings of oil in the Supai-Fort Apache member at 1,675-1,775 ft.

The southwestern corner of the state is a stratigraphic riddle, but chance is the guiding word here, for great thicknesses of fill within the graben valleys have masked the section and little drilling has been done. In the southeastern portion of the Desert province, the section is better known, and the Cretaceous has been established as the prime possibility for oil. To the north, in east-central Arizona, the proven presence of a Permian salt basin lends encouragement to the belief that Paradox-like reef accumulations might be found in the Supai.

The only active test at the moment is Shell's 1 Navajo (arrow on map) in Apache County, on the northeastern flank of Black Mesa basin. This well has recorded Pennsylvanian oil and gas showings on drill-stem tests at 4,670-4,774 ft., 4,886-4,978, 5,100-5,204, and 5,200-5,304 ft. The company is expected to carry the operation to about 6,500 ft. for Devonian penetration. It should prove to be a conclusive test of the northeastern Black Mesa basin area and will no doubt clarify some of Arizona's puzzling stratigraphic problems.

Leasing was very active throughout Arizona during 1953; bonuses paid amounted to more than 4¼ million dollars. The greatest concentration of activity was in the northeastern corner of the state around Black Mesa basin, but to the northwest, blocks of 100,000 acres or more are held, not by major companies, but by small, independent operators. In the southeast, some 50 townships are under lease, several new wildcat wells are scheduled, and new deals are hard to make. The southwestern area reported an oil showing in Yuma County during 1953.

The Arizona Legislature has already started to pave the way for the oil industry by undertaking studies on regulations, tax-exemption factors, and depletion allowances. All will be ready when the first commercial oil well is completed. The market problem, which has occasioned some reluctance to explore, will be solved both by necessity and state sponsorship.

Fig. 1—Ten areas in Lincoln County, Central Oklahoma, are in that county's exploratory and development spotlight. These areas are indicated by letter.

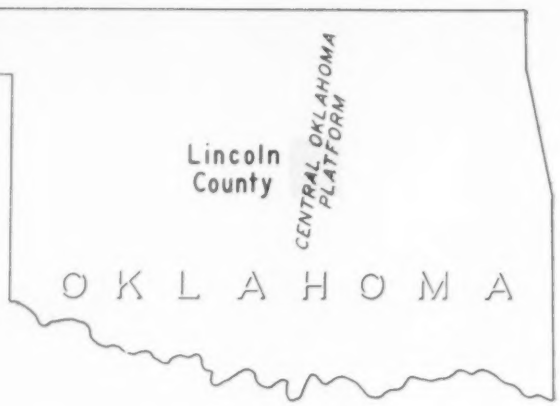

Fig. 2—Lincoln County in Central Oklahoma is one of the state's oldest and busiest counties.

by John C. McCaslin

Oklahoma's Lincoln County in Limelight

Score to date for 1954 stands at 74 successful oil and gas wells

LINCOLN County continues to be one of the most active wildcat and development areas in Oklahoma. Current field work is running at high levels as operators extend both old and new pools, rework older areas, and put down new tests.

Lincoln County lies east of the Nemaha granite ridge on the Central Oklahoma platform which runs north from the Pauls Valley uplift to the Kansas border. The county is one of Oklahoma's most heavily drilled areas. It has been actively prospected for more than 30 years. The continued success of the area is attributable to the existence of many prolific producing sands and complex traps.

The county's total successful completions to March 1 stand at 74 oil and gas wells. Two new discoveries have been officially completed, while a large number of wildcats are drilling or have indicated success.

Southeast Sunflower pool . . . E. L. Oliver has an active development program under way in this new pool in the west-central part of Lincoln County (E on map).

The operator is maintaining success ratio with high flow completions in the pool. The 4 Paschall flowed 42 bbl. of oil hourly on its final flow test from perforations in the Checkerboard sand (Pennsylvanian). The same operator also finaled his 1 State for an initial flow of 40 bbl. of oil hourly. Several other wells are under way in the district. Oliver recently completed a well nearly ½ mile north of previous production in the field to extend it north and northwest of the discovery well. Oliver's 3 Paschall flowed 70 bbl. of oil hourly, natural, also from the Checkerboard sand.

The field's allowable is 45 bbl. per well on an 8/64-in. choke. An important development campaign is expected for a long time in the general Sunflower area.

Middle Peck pool . . . One of the best new pools in Lincoln County is Middle Peck in the east-central part of the county (H on map). The new field had 27 producers up to the first of this year. The discovery well of the pool, Puckett Drilling Co. 1 Harlow, was completed last September with Prue sand production.

Graybol Contracting Corp. recently added two new wells to the east flank of the pool. Another good well in the pool is A. L. Webb 4 Hinds, which flowed 800 bbl. of oil daily through ½-in. choke before being pinched back to state allowable. Eason Oil Co. has a fast development program in progress on the Gokey heirs lease at Middle Peck. One well flowed load and 534 bbl. of oil in 24 hours from the Prue sand after fracturing. Eason has several other wells in operation in the area.

South Wilzetta - Robinson Creek area . . . Olé Robinson Creek pool in the southeastern part of Lincoln County has a new pay zone and a ¼-mile north extension (J on map).

Jones - Shelburne, Inc., 1 Roller flowed at the rate of 7 bbl. of oil hourly natural from Red Fork sand open

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WORLD-WIDE EXPERIENCE

hole. The pool's previous production was from the Wilcox sand and the Hunton lime. The pool was opened in 1946 and had only three producing wells prior to the revival discovery.

A new well was added off the east flank of production in South Wilzetta pool to the north of Robinson Creek with production from the second Wilcox sand. In Wilzetta pool Davidor & Davidor 1 Martinek pumped 34 bbl. of oil in 3 hours from Wilcox perforations for a new producer in that pool.

Davenport field . . . Revival of activity in the county's old Davenport field resulted in an 80-bbl. flowing oil well. Earl E. Barnes 1 Moore flowed through open tubing following fracture from perforations at 3,340-52 ft. in the Prue sand (G on map).

Successful completion is assured for Delaney Drilling Co. 1 Kalka on the north flank of a producing area in the West Davenport district. The well flowed an estimated 38 bbl. of oil per hour from the Prue sand on drill-stem test. Production from Wilcox sand also is situated in the area. South Davenport pool had new Bartlesville sand production at Lincoln Drilling Co. 1 Blaney. Mid-Continent Petroleum Corp. will drill a 4,000-ft. test 1¾ miles south of production in South Davenport pool.

West Mount Vernon pool . . . New West Mount Vernon pool (B on map) has its second well at Jernigan & Morgan 1 Smiser. The well flowed 50 bbl. of load oil hourly after fracture treatment. It later flowed 15 bbl. of new oil per hour for 6 hours on ¼-in. choke. This is the confirmation test and north offset to the discovery well of the pool, which was completed late last year for 25 bbl. daily. The field's southeast offset was dry, and the east offset is drilling.

Globe Oil & Refining Co. is completing a good well at 1 Pritchett in the pool. The well flowed load and 7 bbl. of new oil hourly on 3/16-in. choke after fracturing of Skinner sand perforations at 4,307-11 ft. Wilcox Oil Co. will drill a wildcat 1½ miles west of Mount Vernon pool and 1¾ miles northeast of West Mount Vernon pool.

Southeast Hardscrabble . . . The second well in this new pool established a much better flow rate than the field discovery well (C on map). Less than 3 hours is required for the well to flow its state allowable. East Basin Oil Co. 1 Springer flowed 19 to 22 bbl. of oil hourly on 15/64-in. casing choke. Production is from the Red Fork sand.

The pool was opened last summer by Deep Rock Oil Corp. 1 Tom Rowan "A," which flowed 45 bbl. of oil and some water per day during final tests on ¾-in. tubing choke.

West Wellston pool . . . Viersen & Cochran are completing 1 Williams, opening oil production in this pool (D on map).

The producing area previously consisted of just one well, a gas strike. The 1 Williams flowed 98 bbl. of oil daily natural on ½-in. choke. Production is from open hole in the Checkerboard sand. This well is the northwest offset to Sinclair Oil & Gas Co.'s 1 Tansel, which was completed 3 years ago as a lone gas discovery for 1,790 M.c.f. per day from the Checkerboard.

Chandler field . . . Hilmer & Messenger revived development in this old field by completing a first Wilcox well (F on map). D & L Oil Co. had an indicated Prue discovery well at 1 Hoyt, renewed test at (A on map). The well swabbed 1½ bbl. of oil per hour through casing after fracture treatment.

East Payson pool . . . This prolific Lincoln County pool, opened 2 years ago, has another ½-mile west extension at Mid-Continent Petroleum Corp. 1 Loy (I on map).

The well flowed 250 bbl. of oil per day after fracture treatment in the Skinner sand pay. Nearest pool well is Howard L. Berkey 1 Markwell in SW SW SW 35-13n-4e. This well was completed late in 1953 for a flow of 440 bbl. of oil in 12 hours from the Skinner sand. The Mid-Continent well is located in the SE SE SW 34-13n-4e.

Sunray Oil Corp. plans a 5,500-ft. test at 1 Pollard, 1¾ miles southwest of the pool. It will be located in the SE SE NW 14-12n-4e. Nearest previous test is a 4,554-ft. dry hole about ½ mile east.

OKLAHOMA

Northwest Lindsay Pool Has New Oil Producer

Sinclair Oil & Gas Co. have made completion tests at 1 Rayburn unit in C SW NE 18-5n-4w, Northwest Lindsay pool in McClain County. The well flowed 385 bbl. of 46°-gravity oil in 24 hours through perforations in the first Bromide sand at 11,120-160 ft. on 7/16-in. choke.

Beckham Wildcat Finds Elk City Field Pay

Falcon Seaboard Drilling Co. and Leo Sanders have found an indicated discovery of Elk City field pay at 1 Murphy, C NW SE 24-10n-24w. Gas volume was estimated at 3,000 to 4,000 M.c.f. per day. Distillate find was 58° gravity. An estimated recovery of 1,550 ft. of clean oil is indicated. The pay zone is said to be the Elk City granite wash. It is located 3 miles northwest of Sayre in Beckham County.

Production Tests Slated At Keyes Area Outpost

Cabot Carbon Co. has slated production tests at 1 State-Williams unit, SE SE NW 30-5n-10eCM, Texas County, Oklahoma Panhandle.

A drill-stem test at 4,609-36 ft. flowed oil in 41 minutes at the estimated rate of 20 bbl. per hour. A test taken at 4,609-4,654 ft. flowed oil in 37 minutes. The well gaged 19.6 bbl. the first hour, 16½ bbl. the second hour, and 9.8 bbl. the third hour. The Keyes oil sand was topped at 4,600 ft. The otpost is located 1½ miles from production.

Texas County Development Reaches High Level

New Southeast Camrick oil and gas pool in southeastern Texas County in the Oklahoma Panhandle is experiencing a rapid development program.

The Texas Co. 1 Eldridge, SE SE NW 23-1n-19eCM, north offset to the oil discovery well in the pool, is drilling below 6,712 ft. The discovery well of the pool, the 1 Flowers-Johnson-Eldridge unit, NE NE SW 23, flowed 192 bbl. of oil per day through 21/64-in. choke from Morrow sand perforations at 6,825-55 ft. The gas discovery well in the pool, completed in January is the Texas 1 Cook, C SW NE 27. In Section 14 The Texas Co. 1 Parks unit, C SW NE is below 6,535 ft. Another well in Secton 16 is below 2,458 ft. American Gas Producing 1 Silsbee, SW SW NE 21, is drilling at 5,130 ft. and another well in Section 28 is at 4,090 ft.

Springer Sand Production Extended in Bradley Field

Phillips Petroleum Co. has extended Springer sand production in Grady County's new Bradley field.

The 1 Mayseye, NE NW 2-4n-5w, flowed 165 bbl. of oil in 22 hours through perforations at 9,639-58 ft. The field's discovery well, the 1 Lack, SW SE 35-5n-5w, was completed for a final flow of 75 bbl. of oil per day through small choke from perforations in the Springer sand at 9,430-40 ft.

West Helsel Confirmed

Ashland Oil & Refining Co. has begun production tests at the confirmation attempt to West Helsel field in Cleveland County. The 1 Walker, C NE SW 19-7n-1e, flowed 285 bbl. of oil in 15 hours through 24/64-in. choke. The well produces from the Wilcox.

The discovery well of the field, the 1 Nance, SW SE NW 19, flowed more than 200 bbl. of oil per day through a small choke.

Okfuskee Discovery

A new oil success on the Douglass lease in Okfuskee County, Oklahoma, by Canadian Oil & Gas Co., a wholly owned subsidiary of Canadian Oil & Gas Reserves, Ltd., was announced.

On a production test the well yielded 400 bbl. a day. Production is being reduced to meet the Oklahoma allowable of 60 bbl. a day. The 80-acre Douglass lease is a ¼-mile stepout from production in an area now considered proved, Mayberry said. At least

40 ft. of pay zone was discovered by the new well at 2,814 ft. in the Wapanucka formation.

North Antioch Confirmation Has Good Flow on Test

Garvin County's new North Antioch pool has its second well and confirmation at Magnolia Petroleum Co. 1 Abernathy, SE NW NE 3-3n-2w, the northeast diagonal offset to the pool discovery well.

The strike flowed 192 bbl. of new oil and 32 bbl. of acid water in 24 hours through perforations at 5,900-6,000 ft. on 24/64-in. choke. North Antioch was opened last December by Gene Goff at 1 White, SE SE NW 3. This well flowed 134 bbl. of oil daily from the Viola lime through perforations at 5,907-6,007 ft. The confirmation well also produces from the Viola.

Cisco Pool Opened in Tillman County by Union

Union Oil Co. of California has opened a Cisco pool in Tillman County, southwestern Oklahoma, at 2 Emenhiser, NW SE NE 23-3s-17w. The discovery is good for 96 bbl. of oil daily after swab test of Cisco perforations.

KANSAS

Committee Names Pools

The Mid-Continent Oil and Gas Association's Nomenclature Committee in Kansas has given names to 14 new oil and gas pools in the state, covering 11 different counties.

On the Central Kansas uplift in Barton County Sunny Valley Northeast pool was opened by V. E. Autry et al at 1 Dodge, SE SE SE 6-20s-12w. The Arbuckle discovery is rated at 24 bbl. per day. In Ellis County Petroleum, Inc. opened Koblitz Northwest pool at 1 Baker "A," SW SE NW 15-12s-18w. It is completing in the Arbuckle. On the southwest flank of the uplift in Pawnee County Shiley pool was opened by Cities Service Oil Co. at 1 Risse, NE NE NE 14-20s-20w. It is in process of completion from conglomerate.

On the west flank of the uplift in Pratt County Lion Northeast pool was opened by GMR and Buffalo Oil Co. at 1 Lion "A," SE SE NW 21-27s-11w. It is a Lansing producer. Also in Pratt H. L. Moore 1 Williams, SE SE NW 29-26s-13w, opened Chance Northwest pool for 163 bbl. of oil per day from the Simpson. In Rice County, Raymond East pool was opened by Petroleum, Inc. at 1 Malone "C," SW NW SW 25-20s-10w. It is also a Simpson producer.

On the western side of the uplift in Rush County Ryan East pool was opened at Tatlock Oil Co. 1 Peterson, SW SW SE 36-19s-16w. It is a gas producer in the Arbuckle. Russell County has a new pool at Carter Oil Co. 2 Eulert, NE SW NE 34-11s-15w. The discovery well of Eulert West was finaled for 64 bbl. of oil per day from the Lansing. Centerview pool was opened in Stafford County by Natural Gas & Oil Corp. at 1 Van Lieu, SE NW SW 28-24s-13w. It is an Arbuckle discovery. Also in Stafford Rattlesnake Southeast pool is new at Natural Gas & Oil 1 Harrison, SE NE SE 13-24s-14w. It is also a Lansing producer.

In eastern Kansas' Butler County Pierce Northwest pool was opened by Ed Adair at 1 Corfman, NW NW NW 21-25s-4e. It is completing in the Mississippi. Southern Kansas' Harper County has a new Mississippian pool at Grabs East, opened by Frank Purcell et al 1 Culver, NW NW SE 9-31s-8w, finaled for 66 bbl. of oil per day.

In the Hugoton embayment area in southwestern Kansas Seward County has two new pools, Blue Bell Northwest, opened by Lansekan, Inc. 1 Good "B," C NW NW 20-34s-31w; and Holt pool, opened by Cities Service at 1 Holt "B," C NW NE 28-32s-34w, the first Topeka producer inside of Hugoton gas field.

New Oil Field Assured In West McPherson

Windom field step out and development wells have assured a new producing area for western McPherson County at the southern extreme of the Salina basin.

Oil Trading Corp. 1 Neel, NE SW NE 30-19s-5w, discovery well completed last December in the Mississippian chat for 175 bbl. of oil per day state potential, had a successful drill-stem test in the conglomerate indicating an up the hole pay. Oil Trading Corp., who assembled the deal for Harvey D. Carter, brought in Trans-Era Petroleum, Inc., B&R Division as contractor-operator. In January Carter and Trans-Era 1 Myers, SW SW SE 19-19s-5w, ½ mile north step out was completed testing 40 bbl. of oil per hour from the chat and was potentialed for 400 bbl. of oil per day natural.

Currently the 1 Swanson, NE NE NW 30, is being put on the pump after testing 20 bbl. of oil per hour natural for 5 hours. The operator is drilling at the 2 Neel, NW NW NE 30, and found the Lansing flat with the Myers. It appears that another good well is in the making. E. K. Carey Drilling Co. is drilling at 2,800 ft., ¼ mile north of the Myers well.

APPALACHIAN AREA

OHIO

The largest producer yet found in the shallow pool at Senecaville was completed on 1 Wanita Davis in Lot 6, Richland Township, Guernsey County, Phillips Oil & Gas Co. Sand at 410-436 ft. flowed 300 bbl. in 17 hours from pay at 422-436 ft.

H. C. Collins (2) 1 Andrew Rauber, Section 11, Washington Township, Hocking County, had Clinton sand at 2,814-2,839 ft. with 12 bbl. natural and 240 bbl. in 24 hours after fracturing. The completion is ½-mile from old production.

Another extension of Hanover pool into Perry Township, Licking County, was completed on Frank Westbrook, Lot 1, 4th Qr., by E. H. Everett Co. Sand at 2,936-2,976 ft. had a fair showing natural and 201 bbl. in 24 hours after fracturing.

WEST VIRGINIA

Glade district, Webster County, West Virginia, Gregory Gas Co. 1 J. W. Mills, wildcat elevation 2,325 ft., had a final gage of 1,205,000 cu. ft. of gas after treatment, Maxon sand 1,469 ft., gas 1,472 ft., TD 1,533 ft. Nelson W. Taylor 1 Audra & Harold Crites, is drilling at 750 ft. In Middle Fork district, Randolph County, Washington Natural Gas Co. 1 J. E. Hanifan et al, after having been shut down in the Fifth sand has started up again and is drilling at 2,620 ft. Bobray Exploration Co. 1 Chester C. House, is at 607 ft., P. C. McKenzie Co. 1 Elk Horn Coal Corp., deep test is at 365 ft.

CANADA

Another Viking Hit In Pembina Region

The Socony-Seaboard-Honolulu-Merrill-Cancoll team has struck both natural gas and light gravity crude oil in the Viking sand its step-out driller on the east side of the Pembina oil region. Although only drill-stem test was run in the Viking sand formation, this well shows promise of commercial oil production from that horizon. The well has previously indicated oil production from the Cardium sand, during drill-stem tests earlier this month.

The new find came at Socony-Seaboard 35-8, Buck Creek, LSD 8, 35-47-7w5, is 3¼ miles northeast of the Seaboard-Great Plains-Baysel 6-15 Buck Creek well that found oil in the Cardium and gave up oil encouragement (in the form of oil-cut mud) in the Viking.

Crew at the No. 35-8 well cored into the Viking sand at 5,965 ft., or 3,016 ft. below sea level. One-hour drill-stem test from 5,959 to 5,972 ft. flowed gas to the surface in 7 minutes, at maximum rate 1,000,000 cu. ft. daily and gave up 580 ft. of clean oil and 20 ft. of drilling mud. Crew has resumed drilling operations, and at last report was making hole below 6,560 ft.

Pouce Coupe . . . The Pathfinder-Legion Gas Exploration-Admiral 1 Bay Tree Cadotte formation gas discovery located in the Pouce Coupe area of northwestern Alberta, some 60 miles northwest of Grande Prairie has been capped as a potential gas producer, following completion of potential tests. This discovery was drilled by a three company team of Pathfinder Petroleums, Ltd., Gas Exploration Co. of Alberta, and Canadian Admiral Oils, Ltd., on a 37,000-acre Crown Reservation farmout from Legion Oils, Ltd.

The 1 Bay Tree, LSD 6, 33-79-12w6, finished drilling at 2,600 ft. and 5½-in. production casing was set to total depth. The Cadotte formation, topped at 2,380 ft., or 187 ft. below sea level, showed 30 ft. of effective gas sand pay zone. Production casing was perforated in the interval 2,385 to 2,395 ft. and production tests run. During a restricted flow potential test the well flowed gas at 2,600,000 cu. ft. daily. A small amount of salt water also flowed to surface.

Bellegarde area . . . Socony-Vacuum Exploration Co. has chalked up a discovery of light-gravity crude oil at its exploratory venture in the Bellegarde area of southeast Saskatchewan. Discovery at this well, Socony-Woodley 30-3 Southern Bellegarde, on LSD 3, 30-6-31w1, was indicated during drill-stem tests in the Mission Canyon formation.

Initial drill-stem test in the discovery formation, from 3,417 to 3,435 ft., with valve 90 minutes gave up 100 ft. of gas cut mud and 50 ft. of light brown oil emulsion. Second test of interval 3,434 to 3,444 ft., gave up 160 ft. of gas-cut mud and 110 ft. of muddy oil during the 3 hours that packer was open. Crew of Socony Vacuum's drilling rig then ran a 210-minute test taking in bottom 13 ft. of the first test and the whole of the interval in the second test. That test, from 3,422 to 3,444 ft., gave a small gas flow to surface in 40 minutes and showed 140 ft. of gas-cut mud, 180 ft. of muddy gassy oil and 10 ft. of sulfurous salt water. The fourth reported test was run after crew had cored down to 3,454 ft., of interval 3,443 to 3,454 ft. A pipe recovery of 240 ft. of gassy oil-cut mud and 120 ft. of sulfurous salt water was recorded during the 210-minute test.

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EASTERN CANADA

Gaspe . . . In the Gaspe Peninsula of Quebec, the 1 Tar Point, with gas flow continuing from bottom at 7,069 ft., is preparing for a production test. Casing has been pulled, the hole cleaned out and casing rerun, and accumulated water is now being bailed.

Ontario . . . In Perth County a wildcat test for oil is being started by a local syndicate on the Lester Quipp farm in Elma Township north of Monkton, with drilling crews and equipment previously used on a test for oil near Hickson in Oxford County.

Petrol Oil & Gas Co. of Toronto has through a wholly-owned U. S. subsidiary acquired varying interests in 44 producing oil wells in Texas and Oklahoma. The company has for a number of years carried on development on the Six Nations Indian Reserve near Brantford, Ontario, where it holds exclusive drilling rights on 43,600 acres, and has already completed 38 producing gas wells. The company is planning drilling this year on acreage recently secured in various Alberta areas, including the new Sturgeon Lake field.

NEW MEXICO

SOUTHEAST NEW MEXICO

Roosevelt Discovery Is Completed

Amerada Petroleum Corp. 1-C Federal, Devonian discovery about midway between Lightcap and New Hope fields, rated a daily potential of 186 bbl. of 45° oil, based on a 10-hour gage. Top of the Devonian was 9,216 ft. on elevation of 4,474 ft. and pay section was perforated between 9,229-70 ft.

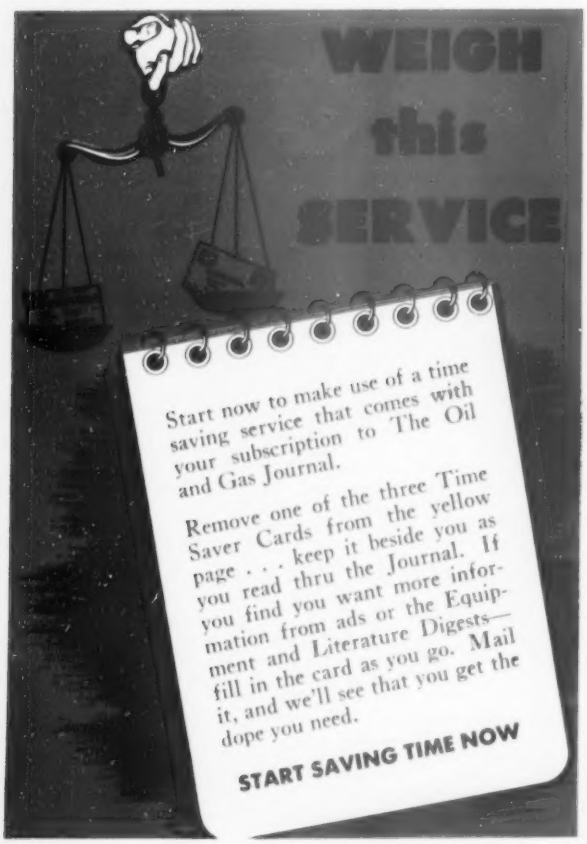
Continental Oil Co. 1 Tom Nolan-Federal, Eddy County, 8 miles northeast of Artesia, recovered mud with no shows on a drill-stem test in Devonian dolomite at 9,192-9,255 ft. Top of the Devonian was 9,190 ft. by samples, on elevation of 3,588 ft.

MICHIGAN

Rotary drilling and deepening operations, inside 5-in. casing were in progress below 3,370 ft. at last report at the W. C. Taggart 3 Wilson-Buers, NW SE SW 1-1s-7e, Salem Township, Washtenaw County.

The Trenton is the objective scheduled to be drilled at this re-work and deepening of a previously-abandoned Salina test located just ½ mile due west of same operator's 1 LeMaster Trenton objective flowing oilwell discovery.

The long string of 5-in. casing was run and cemented at the 3 Wilson-Buers at about 3,270 ft. Bottom joint was perforated to allow for testing oil and gas shows logged in a Niagaran reef at approximately 3,256-65 ft., but after a total of 6,000 gal. of acid had been applied to the show in the Niagara, only a small amount of black oil was recovered and hole was ordered to be drilled ahead. The 5-in. string was run at this point because it was impossible to get 7-in. casing inside of a stub end of 8-in. casing which had been left in the hole when well was originally plugged. Drilling operations were also delayed every time a trip was made because of difficulty experienced in getting back inside the 8-in. casing still in the hole. According to best available in-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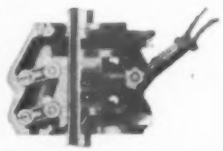

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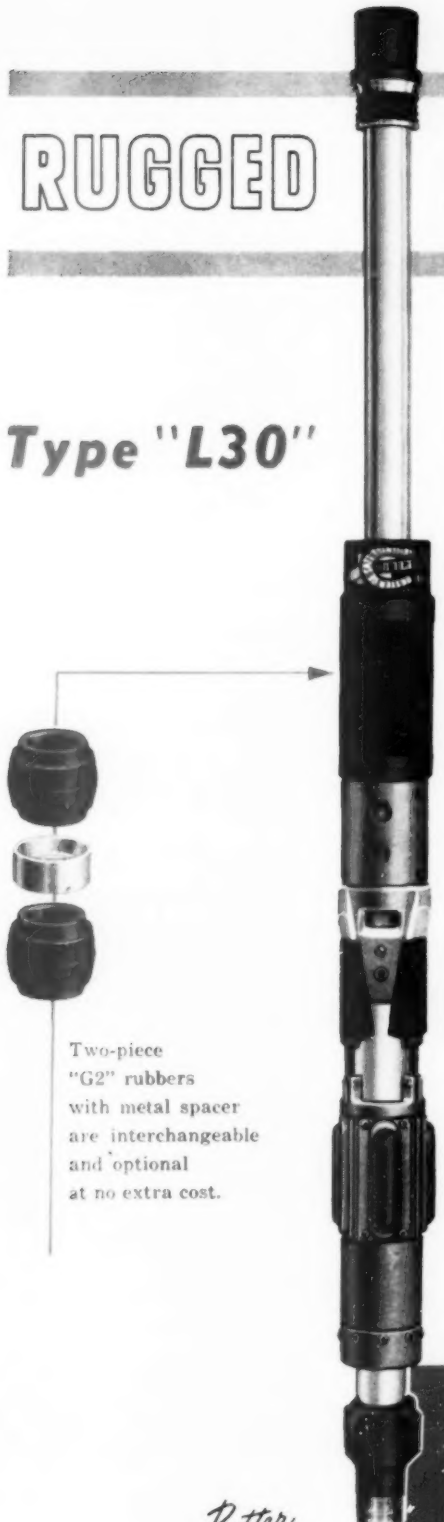

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formation, evidence of a Niagaran reef were missing in the 1 LeMaster well.

Meanwhile, the Taggart 1 LeMaster, still being flowed through a ¼-in. choke, was showing an increase in oil production almost every week. On first tests, well flowed at about 220 to 225 bbl. of oil a day with casing pressure showing at 600 psi. A week later daily production, through the same choke, was averaging about 250 bbl., and in the past week production was said to be up to about 270 bbl. daily with casing pressure showing at about 630 psi. The 1 LeMaster is being produced from a Trenton dolomite pay at 4,397 ft., total depth.

INDIANA

Claude Trusler-Louie Galambos and Ardee Oil Co. 1 Dr. Charles Klamer, 7 miles east of Petersburg in 35-1n-7w, Pike County, recovered 1,000 ft. of gas, 10 ft. of free oil, 220 ft. oil, slightly mud-cut, and 10 ft. of drilling mud on a 2-hour drill-stem test at 2,660-77 ft. in the Devonian. Completion is pending cable tool equipment.

ROCKY MOUNTAIN

NEVADA

Shell Tests Lower Zone At Nye County Discovery

Shell Oil Co. reported recovery of additional oil on test of a zone lower than that originally, indicating a discovery at 1 Unit, SE NE NW 35-9n-57e, in the Eagle Springs area of Nye County. Test of the interval 6,538-6,724 ft. with 287 ft. water cushion recovered 2,097 ft. of fluid, of which 1,410 ft. was net rise. The recovery included 480 ft. of slightly oily water and 1,617 ft. of gassy, watery oil, emulsified with the cushion. Flowing pressure was 500-1,000 psi. Tool was open for 2½ hours. Gravity of oil recovered was 22.5° wet.

Shell has cored ahead below 6,724 ft. and will test lower zones. On two previous tests some oil was recovered. From the zone 6,530-88 ft. an estimated 40 ft. of oil dispersed through water cushion and 140 ft. of slightly oil gas-cut mud was recovered. Another test 6,583-6,638 ft. recovered 90 ft. of oil, 930 ft. of slightly oily, muddy water.

The formation tested in these and prior tests has not been identified by the operator. A core 6,580-6,608 ft. recovered crystolithic tuff with inclusions of other volcanics, indicating production from a horizon which has not been anywhere previously recorded as productive.

Gulf's Nevada Exploration Has No Shows

Gulf Oil Corp. officially denied rumors of shows in one or more of the three wildcats which the company is now drilling in the state. At 1 Wilkins Ranch, NE NE NE 21-38n-61e, Elko County, a depth of 7,030 ft. was reported, with the operator preparing to shut down and move in larger rig. Also in Elko County, Gulf's 1 Government, SE SW 8-40n-66e was reported drilling below 6,008 ft. with no shows. In White Pine County, Gulf will abandon 1 Dennison-Federal, NE NW SW 20-26n-70w, after losing in fish in hole. Total depth is 4,438 ft.

ARIZONA

New Shows Reported at Apache County Wildcat

Shell Oil Co. recovered additional shows of gas and slight shows of oil in tests of new zones in 1 Navajo, C SE SE 6-41n-29e, Apache County, in the northeastern part of the state. Test of the zone 5,738-5,820 ft. made gas at the rate of 50,000 cu. ft. per day. Recovery in pipe was 275 ft. of gas-cut mud and 4,005 ft. of salt water under flowing pressure of 1,020-1,850 psi. A trace of oil in 3,670 ft. of gas-cut water was recovered on test of the zone 6,014-80 ft. Shell is reported drilling below 6,150 ft. with last top reported that of Leadville at 5,546 ft.

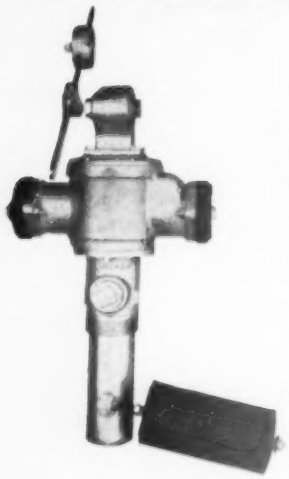
COLORADO

Prowers County Wildcat Testing

Terminal Facilities, Inc. (Cities Service) has released data on early tests of the tight hole, 1-A Holt, NE NE SW 6-26s-43w, in Prowers County. The well was perforated in several zones from 4,298 to 4,330 ft. and tests of the perforations had no shows with the exception of a very light oil scum. The operator has released no tops and is continuing to perforate and test uphole.

South Greasewood Discovery

S. D. Johnson and Cortlandt Dietler of Denver reported a flow of 400 bbl. of oil in 10 hours at 1 Spinner, C NE NE 35-6n-61w, Weld County. The discovery is about 5 miles south of production in Greasewood field. Production is from "D" sand at 6,668-



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78 ft. The operators are continuing to test at the wildcat which has added interest to the westward movement of exploration to Cretaceous horizons in the Denver-Julesburg basin.

Washington County Discovery Completed

Continental Oil Co. has completed 1 Shelby, NE NE SW 9-1s-56w, discovery well in the Bobcat pool, Washington County for a flow of 645 bbl. of oil daily through 1-in. choke. Production is from the "D" sand interval 5,131-66 ft. The discovery is about 2 miles northeast of Little Beaver production.

A second well in this field has also been completed. The confirmation, 2 Shelby, NE NW SW 9-1s-56w, flowed at the rate of 480 bbl. of oil daily, also through 1-in. choke. Two other wells in the newly discovered pool are nearing completion, both apparently to be good producers.

WYOMING

Northwest Sheldon Dome Discovery Testing

Skelly Oil Co. is testing an apparent Curtis sand discovery at 1 Tribal, SW SW SW 36-6n-3w (WRM) northwest of Sheldon Dome production in Fremont County. Casing was set at 3,350 ft. and perforations have not been released by the operator. The well is reported as swabbing at the rate of 10 bbl. of oil per hour. On drill-stem test of the zone 3,261-88 ft. recovered 820 ft. of oil and another 3,287-3,329 ft. recovered 420 ft. of oil. No official report of tests at the well has been made by the operator. The discovery is 5 miles southwest of production at Circle Ridge.

Manderson Tensleep Discovery Pumps

A pump gage of 97 bbl. per day has been reported at L. J. Peterson's discovery in Tensleep in the South Manderson area of Big Horn County. The well is 2 Wycol-Government, C SW NW 1-49n-92w. Top of Tensleep was found at 5,879 ft. The well had a substantial saturated section of Phosphoria, which is the producing formation in other wells in the area, but is being completed in Tensleep due to lack of facilities for handling sour crude and gas produced from Phosphoria.

MONTANA

Fallon County Location Announced

I. W. Love is reported moving in materials at 1 Ferguson-Goldin, C N½ SE SW 18-7n-61e in the Baker area of Fallon County. The well is on farmout from Mon-O-Co Oil Co. and will test to about 9,500 ft.

Brorson Confirmation Has Madison Shows

New shows in Madison at 2 Dynneson, C SW SW 29-24n-58e, in the Brorson area of Richland County have been reported by Sun Oil Co. and Phillips Petroleum Co. Test 9,393-9,433 ft. recovered 650 ft. of gas and oil-cut mud, with about 10 per cent oil. On the 5-hour test recovery also included the heavily gas and slightly oil-cut water cushion. Cores through much of the Madison zone drilling to present depth of 9,507 ft. have had shows. The discovery well in the field produced from Ordovician but had a considerable section of Madison with shows of possible commercial value which was not thoroughly tested.

Kimball County Wildcat Finds "J" Sand Oil

Superior Oil Co. has reported recovery of 1,320 ft. of oil on test of the "J" sand zone 6,326-47 ft. at 64-3 Dietz, SE SW NE 3-13n-55w, Kimball County. Tool was open 1 hour and recovery also included 180 ft. of heavily oil-cut mud. Flowing pressure was 100-600 psi. Top of the "J" sand was found at 6,312 ft. and the operator is coring ahead. There were no shows in "D" sand in the wildcat which is about 1½ miles north of Enders field production.

NORTH DAKOTA

New Wildcats Spotted Through State

Several new locations of more than routine interest have been announced by operators on North Dakota prospects. W. H. Hunt has made location for 1 Weyrauch, C NE NW 27-156n-97w, 9 miles west of Beaver Lodge field in Williams County. Test will be of Madison.

Phillips Petroleum Co., Skelly Oil Co. and Gulf Oil Corp. will drill a joint deep test in the Poe area, McKenzie County. The well, 1 Hoehn, C NE SE 13-152n-102w, will test

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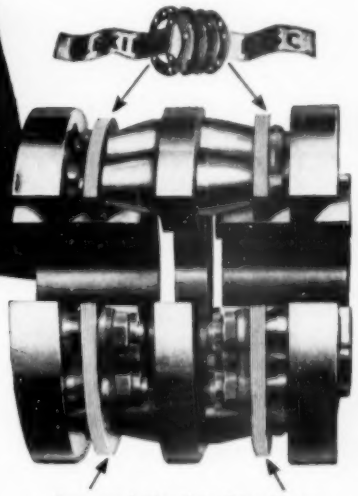

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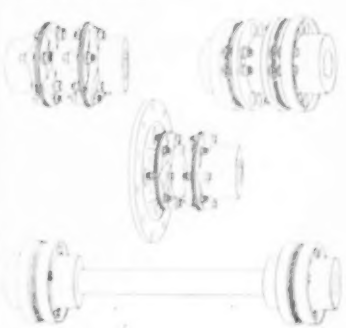

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to Red River (Devonian). It is about 14 miles southwest of the town of Williston.

In Divide County, Pure Oil Co. has made location for 1 Gunderson, SW NW 11-160n-98w, about 18 miles northwest of Tioga field. This well will also be a Madison test.

NORTHERN NEW MEXICO

Stanolind Oil & Gas Co. has plugged back to Pennsylvanian with apparently commercial results at the Hogback, San Juan County discovery which was completed in Mississippian in 1952. The well is 13 USG, SE SW NE 19-29n-16w. At initial completion production was 139 bbl. of oil and 14,900,000 cu. ft. of non-inflammable gas from the zone 6,930-7,030 ft. The well has been plugged back and perforated in Pennsylvanian which was topped at 5,300 ft. (Hermosa) and flowed 225 bbl. of 50.5°-gravity oil, 6 bbl. of water and 2,038,000 cu. ft. of inflammable gas in 11 hours. Tests are continuing.

CALIFORNIA

Pipe Set in Orange County Wildcat

An old California adage to the effect there is no oil south of the Santa Ana River may be disproved by a Texas Co. wildcat near San Juan Capistrano, approximately 20 miles southeast of nearest oil production. With hole bottomed at 7,044 ft., pipe has been set at about 4,000 ft. in its 1 O'Neill Estate.

Scout reports credit the wildcat as having yielded condensate or high-gravity crude on a formation test at approximately 6,900 ft. The report was not confirmed by the operator but the wildcat has been classed as a no-dope hole. Site of the test is in SE NE 22-8s-7w.

Signal Hill Extended

The Texas Co.'s first test of its 1,040-acre Long Beach Municipal Airport lease resulted in proving the tract productive, though possibly not economically. Its 1 Long Beach Airport was completed as a ½-mile northeast extension to the deep Signal Hill pool, flowing 191 bbl. in the first 24-hour period and 141 bbl. during the second 24 hours. The 32°-gravity crude was produced through a ¼-in. choke. It came from perforated intervals totaling 160 ft. between 8,775 and 9,040 ft. The test had been drilled to 13,016 ft. before being plugged back.

Oxnard Outpost Testing

Lloyd Corp., Ltd., was testing the water shut-off in its deep test near Oxnard, Ventura County, after setting 7-in. casing at 9,989 ft. The wildcat, 1 Lloyd Corp.-W. R. Livingston, is ½ mile northeast of the discovery well completed last year by Standard Oil Co. of California. It is almost ¾ mile west of Standard's recently suspended 1 Scholle-Livingston. Located in SE SW 31-2n-21w, its total depth is 9,994 ft.

Guijarral Hills Tests Successful

Standard Oil Co. of California completed a ½-mile east outpost to the one-well West Guijarral Hills field, Fresno County, as a 1,400-bbl. producer in the 8,300-ft. Leda sand. Site of the test, 3 33-F, is in SW NW 33-20s-16e. Standard was preparing to start

23 33-F as an east offset. L. A. Harnish, Oper. 83 "Well" was below 6,000 ft. one location west, midway between the discovery and the extensioner.

On the northeast edge of Guijarral Hills field, Los Nietos Co. was completing 81-34 Allison as a ¼-mile southwest extension to the new Leda sand pool opened earlier this year. Originally completed in the shallower Allison pay, the test was deepened from about 8,400 ft. to 8,780 ft.

TEXAS

WEST TEXAS

Gaines County Wildcat Is Devonian Discovery

Rowan Drilling Co. et al 1 Stanton-Brunson, in southeastern Gaines County, developed flowing oil on its second drill-stem test of the Devonian, and after the third successful test, had 85 ft. of pay section indicated. Operators planned to drill ahead and continue testing.

Sample top on the Devonian was 12,620 ft., minus 9,488 ft. A 4-hour test in the top at 12,622-12,640 ft. recovered 1,258 ft. of free oil, and no water. On test from 12,640-12,665 ft., the well had oil at the top in 2 hours and 45 minutes. It was flowed into pits for 1 hour and 28 minutes, then turned into tanks through 1-in. choke, to gage 40.29 bbl. of oil in 1 hour. Third test, from 12,665-12,705 ft. the well flowed 104.4 bbl. of oil the first hour and 110.8 bbl. the second hour.

Location is in League 308, Terrell County School Lands Survey, 11 miles southeast of Seminole, and 8 miles northwest of Glasco-Devonian field.

Hockley County . . . A second Pennsylvanian producer was in sight for West Ropes pool northwest of Ropesville. Shell Oil Co. 1-A Thompson, diagonal northeast offset to the field discovery, had flowing oil in 34 minutes on drill-stem test from 9,874-9,900 ft. After cleaning into pits, the well gaged 105 bbl. of oil in 1 hour and 45 minutes. Second test, from 9,900-9,925 ft., headed oil and water, and unloaded while pipe was laid down.

Pecos County . . . Phillips Petroleum Co. 1-H Puckett, a northwest extension well to the Glenna-Ellenburger field, flowed dry gas from a higher pay zone, which was thought to be Wolfcamp or Pennsylvanian. Casing was perforated at intervals between 12,318-13,298 ft. then acidized. The flow of gas followed, at a daily rate of 8,348,000 cu., through 1-in. choke.

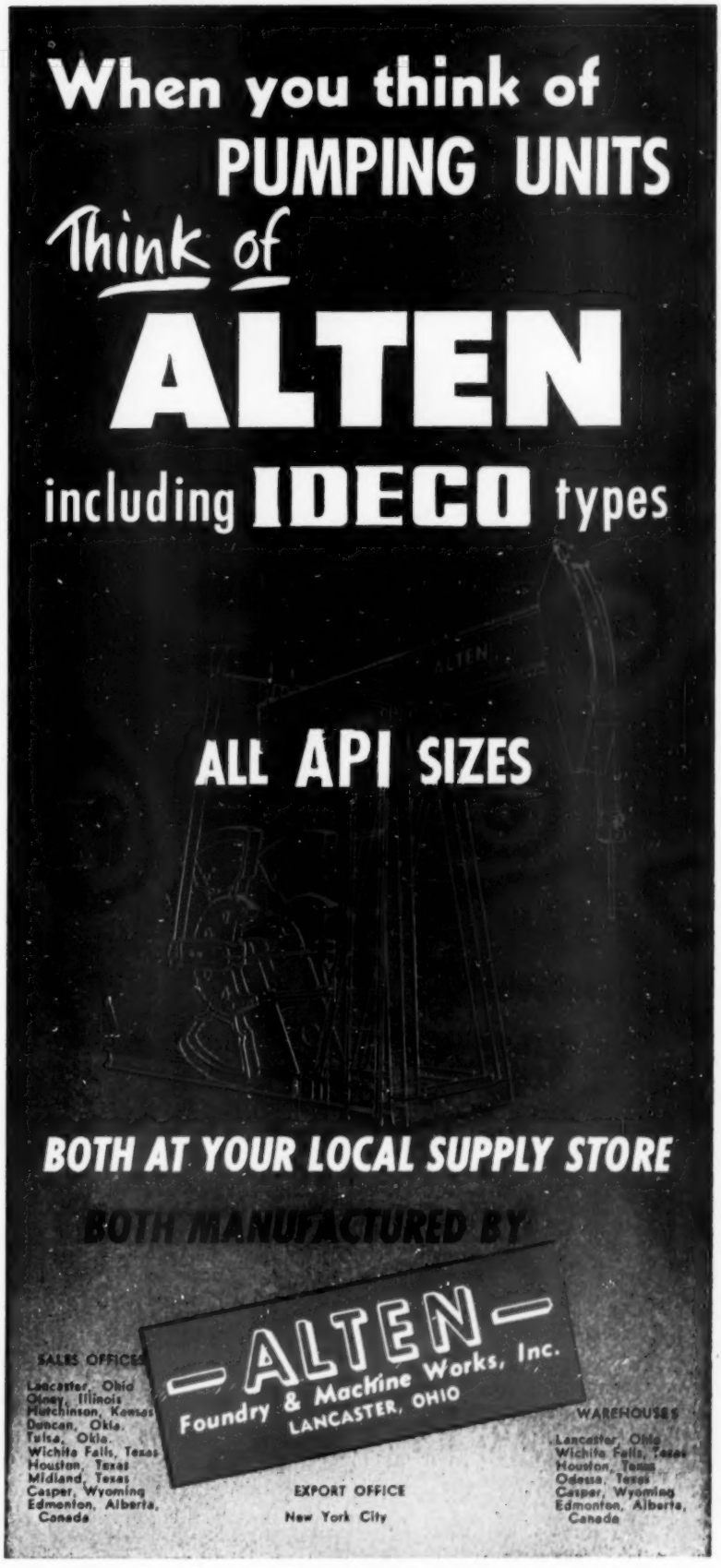
This well was drilled to 14,000 ft., then plugged back to 13,425 ft. It was in the Simpson at total depth, and said to be running low structurally to Ellenburger producers in the field. Sample top on the Simpson was 13,932 ft. Location in approximately the NE NE of 55-101-TCRR Survey is 3 miles northwest of the Glenna discovery.

NORTH TEXAS

Nolan County is Center of Drilling Interest

Nolan County had three discoveries assured last week. These included an Ellenburger well just east of Blackwell near the southern county line, and the addition of Caddo and Cambrian as new pay zones in the North Dora-Ellenburger field.

The new Cambrian producer is Skelly Oil Co. 3-B Boyd, Section 58-20-T&P Survey,



which lies about 4 miles southwest of similar production in White Flat field. Sample top on the Cambrian was 5,958 ft. and first drill-stem test was run from 5,950-84 ft. Gas surfaced in 3 minutes and oil in 21 minutes, which then flowed at the rate of 73 bbl. an hour. Thirty-minute shut-in pressure registered 2,272 psi. Operators then cored ahead and was reported to have recovered saturated sand to 6,053 ft.

First well slated for completion in Caddo pay is U. S. Smelting, Mining & Refining Co. 1-C TXL "A," which lies approximately ½ mile to the east of Skelly's Cambrian discovery, and is a twin to the firm's 1-A TXL. The latter completed as an Ellenburger well but found oil in the Caddo.

On completion test through 34/64-in. choke, the 1-C made 236.5 bbl. of 43° oil a day from perforations at 5,870-88 ft. Total depth was 5,893 ft.

The Ellenburger discovery is Neville G. Penrose, Inc., et al 1 Kirk, 1 mile east of Blackwell. Top of the Ellenburger was 6,240 ft. on elevation of 2,056 ft. First drill-stem test from 6,269-80 ft. had oil at the top in 1 hour and 58 minutes, but flow, if any, was not disclosed. Recovery in the pipe included 30 ft. of water. A flow test on the same interval gaged 193 bbl. of oil in 23½ hours. Recovery also included a small amount of salty water.

Nearest Ellenburger production to the 1 Kirk is 4 miles to the north in Blackwell field.

New pay in the Strawn has been added to North Favor-Ellenburger field, northeast of Sweetwater, at Cities Service Oil Co. 1 Chitwood. This well completed from the Ellenburger at 6,076-84 ft. and 6,126-36 ft., then prepared to dually complete from Strawn pay at 5,702-20 ft.

TEXAS GULF COAST

New Gas-Condensate Well Extends Echo Production

Gas-condensate production in the Echo area, 4 miles northwest of Orange, in Orange County, has been extended a half mile to the southwest.

The extension well, 1 Sonnier, completed by Pacific Producing Corp., produced at the rate of 28,000,000 cu. ft. of gas per day on open-flow potential tests. Gas sprayed 58°-gravity condensate with a ratio of 75,000 cu. ft. per barrel.

Production is from Frio sand at 8,147-51 ft. in hole drilled to 8,450 ft.

Several miles to the northeast in what is designated as the Northeast Echo area, John Mecom and Magnolia Petroleum Co. are starting a deep test at 1 Powell. Location is 2,150 ft. west of the discovery well, completed last June as an oil producer from sand at 8,700-02 ft. The test is set up to go to 9,500 ft.

Three Tests Starting in New Harris County Field

Development of the new oil-producing area opened by Geotek Oil Co. and Newman Brothers Drilling Co. 5 miles southeast of Tomball and 2 miles southeast of Tomball production, in northern Harris County, is getting under way rapidly with the starting of three additional tests.

On potential gage taken last week, the discovery well, 1 Ziegenahain, flowed 127 bbl. of 37°-gravity oil per day through ⅛-in. choke. The well is producing from Cockfield sand at 5,843-45 ft. With gas-oil ratio of only 200 cu. ft. per barrel under pressure of 650 psi.

The discovery follows the finding of gas production in the slightly shallower First Cockfield sand in a wildcat completed by the same operators last December about a mile to the north. That well, 1 Neuhaus, had an open-flow potential of 4,180,000 cu. ft. per day with pay at 5,712-20 ft.

Since the oil discovery, the same operators have moved their rig 3,300 ft. southeast, where they are drilling 1 Rubach as the initial confirmation test. Also, P. R. Rutherford is starting a 660-ft. southwest offset to the discovery at 1 Wilson. To the west, B & D Development Co. has location for 1 Lewis, in the William Perkins Survey. All new operations are projected to 7,000 ft. for a look at the Yegua, to which the discovery well was drilled.

South Stowell Area Gets Large Extension Gas Well

Deep South Oil Co. has a new gas well located nearly a mile southeast of production in the South Stowell area, Jefferson County, at its 1 Wolfe.

Open-flow potential gage was at the rate of 72,000,000 cu. ft. of gas daily. Tests indicated a gas-condensate ratio of 420,000 cu. ft. per barrel. Production is from sand at 8,500-26 ft. The area is 6 miles east of Stowell, southwest of Beaumont.

SOUTHWEST TEXAS

Yzaguirre Field Gets Tenth Producing Zone

Taylor Oil & Gas Co. has opened another gas-condensate zone in Yzaguirre field, Starr County, with its 6 Cameron, completed with a potential rating of 3,400,000 cu. ft. of gas daily, open flow, from pay at 7,242-60 ft. Gas yielded 65.5°-gravity condensate with a ratio of 42,000 cu. ft. per barrel. Shut-in pressure gaged 2,821 psi.

The field, discovered in 1940, now has 10 pay zones, 7 productive of oil and 3 of gas and condensate. Location is 22 miles north of Sullivan City.

Third Pay Zone Indicated In South Robstown Field

Opening of the third pay zone in South Robstown field, Nueces County, is virtually assured by C. G. Glasscock at his 2 Wilson, in which a 15-minute drill test of perforations of a sand interval at 5,354-59 ft. flowed gas with a working pressure of 1,725 psi. and recovered 30 ft. of condensate. Bottom-hole pressure gaged 2,275 psi. flowing, and 2,460 psi. shut in. The well is shut in pending open-flow potential test.

The field's discovery well, completed in June 1953, produces gas and condensate from sands at 5,603-06 ft. and 6,904-07 ft. The second well, completed by Warren Petroleum Corp. last August, produces oil from sand interval at 5,598-5,604 ft. The new indicated well, east of the above wells, is the third for the field.

ILLINOIS

Calvert Drilling Co. has set casing on a Silurian dolomite wildcat 7 miles southwest of Sun Oil Co.'s two Silurian oil wells. M. H. Richardson 1 Long flowed 12 bbl. of oil per hour from the Silurian and is 5 miles west of Sun Oil Co. and 3 miles north of Calvert's wells, forming an area which could be one large structure in adjoining Macon and Christian counties.

LOUISIANA

NORTH LOUISIANA

Tuscaloosa Oil Well Finaled in Tensas

Interstate Natural Gas Co. has completed a marginal lower Tuscaloosa oil well 1 mile southwest of St. Joseph in eastern Tensas Parish, east-central Louisiana.

The 1 Sibley flowed 35 bbl. of 42°-gravity oil per day with no water from perforations at 9,156-67 ft. in a stray sand of the lower Tuscaloosa series. It is located in 21-11n-12e.

SOUTH LOUISIANA

Deep Lake Field Adds New Producing Zone

The multiple-pay Deep Lake gas-condensate field, in Cameron Parish, added another producing zone with completion by Royalite Oil Co., Inc., of its 1 State Lease 2353 with a calculated open-flow potential of 18,000,000 cu. ft. of gas daily from sand interval at 9,089-92 ft.

On pre-potential tests, the well flowed at the rate of 2,620,000 cu. ft. of gas and 129 bbl. of 56°-gravity condensate per day through 12/64-in. choke. Bottom-hole flowing pressure gaged 3,970 psi.

Although this is the first well completed in the 9,100-ft. sand, productivity of the sand previously had been established by tests in another well drilled by Superior Oil Co.

Superior's well, 2 Rockefeller-State Lease 2038, tested a flow of 94.23 bbl. of 55.7°-gravity condensate and 7,225,000 cu. ft. of gas daily from perforations at 9,115-27 ft., but was completed finally in one of the field's other productive zones.

Royalite's well, located on the northwest side of the field, is the first successful completion on that company's 14,000-acre block of state leases acquired in 1953. Royalite Oil Co., Inc., is a wholly owned United States subsidiary of Royalite Oil Co., Ltd., of Calgary, Alta.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Caldwell County: F. C. Cooper and Roy Shinault 1 Rainey, T. J. Halton Sur. Dry. TD 1,200 ft.

Dimmit County: Western Natural Gas Co. 1 Dillon, Lot 3, Sec. 35, "C" Subd., Catarina Farms, T&NO Sur. 65, A-762. Shut down. TD 13,014 ft.

Duval County: Cities Production Corp. 1 Saenz, Share 6, San Francisco Grant, A-216. Dry. TD 7,015 ft.

J. W. Gorman 1 Herbst, SA&MG Sur. 71, Certificate 21/324. Dry. TD 4,478 ft.

Hidalgo County: T. C. Huddle 1 McAllen, Tract 1, Valley Farms Subd., Santa Anita Grant. Dry. TD 8,140 ft.

Kenedy County: Humble Oil & Refining Co. 1-D East, Las Motas de la Barreta Grant. Dry. TD 12,000 ft.

Jim Wells County: H. R. Smith et al 2 Floyd, Lot 21, Magnolia Fig & Orange Colony Subd. Dry. TD 6,005 ft.

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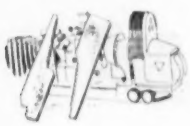

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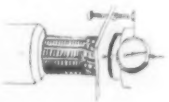

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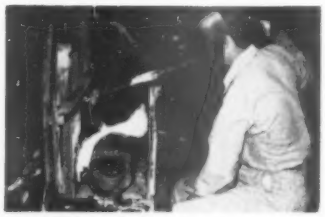

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REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

WILDCAT COMPLETIONS

McMullen County: Harry Brown 1 Cockerham Ranch, Luciano Musquez Sur., A-699. Dry. TD 2,297 ft.

Medina County: V. E. Nicholson et al 2 Jungman, E. C. Durst Sur. 13. Dry. TD 989 ft.

San Patricio County: Jake L. Hamon et al 1 Guynes, Blk. 12, Schleicher & Joseph Subd., Delgado Grant. Dry. TD 3,216 ft.

Starr County: Jack Little 1 Guerrero et al, Share 58, Porcion 70. Dry. TD 1,450 ft.

Travis County: Reussir Oil Corp. 1 Alexander, Jose Antonio Navarfo Sur. Dry. TD 1,530 ft.

Wilson County M. L. Wise and O. W. Killam 1 Stanley Bench, C. C. Irrigation Co. Sur., A-386. Dry. TD 5,690 ft.

TEXAS GULF COAST

Bee County: J. W. Gorman et al 7 Borroum, Bee County School Land Sur., A-103. Dry. TD 4,405 ft.

Brazoria County: Charles H. Osmond et al 1 Gulf-Mitchell, T.&W. Alley Sur. 64, A-2 (Allen Dome). Dry. TD 6,621 ft.

Colorado County: Cecil N. Housh 1 Zwiegel, J. Cummings Lge., A-12. IPP 34.81 BOPD, 34.5°, perforations 10,129-75 ft. TD 10,320 ft. (New pay in Cecil Noble field.)

DeWitt County: Chicago Corp. 1 Pargmann et al, Antonio Lazo Sur., A-653. Dry. TD 4,514 ft.

Harris County: Gulf Coast Leaseholds, Inc., 1 Hastings unit, J. De Cordova Sur., A-237. Dry. TD 10,936 ft.

Jackson County: T. J. Ahern et al 1 Burns, W. D. Sutherland Sur., A-76. Dry. TD 6,703 ft.

Jefferson County: Clegg & Hunt et al 1 Phelan et al, W. R. Hebert Sur. 14, A-566. IP 170.50 BOPD, ⅛-in., 41.5°, Hackberry 7,836-40½ ft. (perforations). TD 8,233 ft. (New field—Phelan.)

Currie B. Davis 1 Quinn & Broussard trust, S. Morris Sur., A-42. Shut down. TD 7,008 ft.

Liberty County: Drilling & Exploration Co., Inc., 1 Boyt, Carry Meche Sur. 25, A-760. IP 5,800 M.c.f. daily, open-flow potential, perforations 2,879-81 ft. TD 8,503 ft. TD 8,503 ft. (New field.)

Live Oak County: Leo Harper 1 Weston et al, Tom Weston Sur. 34, A-954. Dry. TD 5,850 ft.

Southern Minerals Corp. 1 Burnett, Francisco Leal Sur., A-22. Dry. TD 8,715 ft.

Polk County: H. B. & B. Drilling Corp. 1 Broman, A. Viesca Lge. IP 40.7 BOPD, 10/64-in., 29.6°, perforations 3,472-77 ft. TD 4,398 ft. (New pay in Goodrich field.)

Victoria County: Alaska Steamship Co. and Newman Brothers Drilling Co. 1 McCan, Hannibal Bonny Sur., A-138. Dry. TD 7,533 ft.

Monterey Exploration Co. 1 Murphy, Carlos & Rafael de la Garza Sur. Dry. TD 6,300 ft.

Wharton County: Tide Water Associated Oil Co. 2 Duncan, HE&WT Sur., A-419. IP 772 M.c.f. daily, ⅝-in., perforations 2,787-2,800 ft. TD 7,462 ft. (New pay in, and extends West Bernard field.)

EAST TEXAS

Cherokee County: L. A. Grelling 1 Kate Adams, Isaac Reynolds Sur., 2½ miles NE Ironton. IP 158.5 BOPD, 12/64-in., 43°, Woodbine 4,856-59 ft. TD 4,908 ft.

Ellis County: American Liberty Oil Co. 1 McClain, 23-8-Rafael Pena Sur., A-3. Dry. TD 4,273 ft.

J. Robert Phillips, Jr. 1 Tomsu, J. K. Looney Sur. Dry. TD 2,467 ft.

Harrison County: F. R. Jackson 1 Jones, Samuel Murphy Sur., A-15. Dry. TD 6,930 ft.

Navarro County: W. E. Butler and Great Western Drilling Co. 1 Cerf, James Smith Sur. Dry. TD 2,100 ft.

Red River County: Buzbee Lumber Co. 1-A Sam Buzbee, Benjamin Gooch Sur. Dry. TD 1,820 ft.

Smith County: L. A. Grelling et al 1 Bledsoe, Wm. Miller Sur., A-638. Dry. TD 4,600 ft.

WEST CENTRAL TEXAS

Brown County: Jackson & Frost 1 Slusher, Wm. Badgett Sur. Dry. TD 1,142 ft.

Callahan County: Harding Bros. 1 Cornelius, Gro. M. Vigal Sur. 798, 4½ miles NW Cross Plains. IP 55 BOPD, 24/64-in., 44°, Cross Plains pay 1,749-57 ft. TD 1,757 ft.

Johnson & Warren 1-A Scott, Mial Scurlock Sur. 207. Dry. TD 1,870 ft.

Coleman County: Texas Pacific Coal & Oil Co. 1 Dunman, Sec. 33, T&NO Sur. Dry. TD 4,026 ft. Elev. 1,948 ft., Caddo 3,977 ft.

Fisher County: Ultra Oil Co. 1 Stephens, 115-2-H&TC. Dry. TD 5,878 ft.

Haskell County: Sojourner Drilling Co. 1 Cox, Harmin Spinks Sur. 33. Dry. TD 5,119 ft.

Jones County: Jones & Stasney 1 Shaheen, 50-15-T&P. Dry. TD 2,195 ft.

S. W. Petre 1-B White, 36-16-T&P. Dry. TD 2,505 ft.

Sojourner Drilling Co. 1-C Crow, 42-2-SPRR. Dry. TD 3,555 ft.

E. L. Wilson 1 Cox, Sec. 3, GH&H Sur. Dry. TD 3,180 ft.

TRIAD OIL CO. LTD. APPOINTMENTS

Hon. M. R. Bridgeman, C.B.E.

A. F. Down, O.B.E., M.C.

E. H. Tanner, President of Triad Oil Co. Ltd., announces the appointment of two additional directors, The Honourable M. R. Bridgeman, C.B.E., and A. F. Down, O.B.E., M.C. Both were nominated to the Triad Board by D'Arcy Exploration Company Limited, a wholly-owned subsidiary of Anglo-Iranian. D'Arcy Exploration recently made a substantial purchase of Triad shares.

Mr. Bridgeman, who is Managing-Director of D'Arcy Exploration, and Mr. Down were members of the party from Anglo-Iranian which visited Canada last August. Mr. Down will be Anglo-Iranian's resident representative in Canada.

Mr. Bridgeman joined Anglo-Iranian in 1926. During the war he was Petroleum Adviser to the Ministry of Economic Warfare in 1939 and was lent in the same capacity to the Government of India in 1942. From 1944 to 1946 he was Principal Assistant Secretary, Petroleum Division, Ministry of Fuel and Power.

Mr. Down joined Anglo-Iranian in 1938 after qualifying as a Chartered Accountant. He has worked at Haifa, Abadan, and in the Persian oilfields as well as at Anglo-Iranian's London headquarters. During the war, after serving in the Middle East and Italy, he was with the Canadian forces in Belgium, Holland and Germany, ending his war service as a Colonel on the staff of Canadian Army Headquarters.

WILDCAT COMPLETIONS

Nolan County: Thos. D. Humphrey & Sons 1 Lewis, 108-X-T&P. Dry. TD 6,846 ft. Elev. 2,515 ft., Strawn 5,795 ft., Mississippian 6,685 ft.

Palo Pinto County: Watson & Williams Drilling Co. 2 Bridges, R. Clark Sur., A-135. Dry. TD 1,800 ft.

Stephens County: AB-Tex Drilling Co. 1 Tucker, 12-7-T&P. Dry. TD 2,280 ft.

Taylor County: Davidson & Fitzgerald 1 Loffland, 12-1-SPRR, 5 miles NE Tuscola. IP 298 BOPD, 20/64-in., 39°, Flippen pay 2,297-2,302 ft. TD 2,950 ft.

G & H Constructors, Inc. 1 Rister, 23-2-SPRR. Dry. TD 2,708 ft.

NORTH TEXAS

Archer County: Cochran, Timberlake & Kelleher 1-A Hausler, EMKT Sur. Dry. TD 1,203 ft.

A. P. Kouri 1 Kempner, 42-A1027-H&GN, 4½ miles SE Kamay. IP 199 BOPD, 20/64-in., 41°, Strawn perforations 3,870-3,906 ft. TD 4,158 ft.

Tom B. Medders 1 Petrex, Blk. 108, ATNCL Subd. Dry. TD 5,460 ft. Ellenburger 5,297 ft.

Baylor County: Miami Operating Co. 1 Henry Harmel, Blk. 166, T&NO Sur. Dry. TD 5,483 ft.

Oakland Corp. 1 Jungman, 24-45-H&TC. Dry. TD 2,632 ft.

Cooke County: Leland Fikes 1 Ward, T. Toby Sur., A-1064. Dry. TD 4,004 ft.

Ralph H. Snuggs et al 1 Smith, G. O. Summerlin Sur., A-947. Dry. TD 3,870 ft.

Denton County: A. D. Beck 1 Harve Williams, N. Coker Sur., A-249. Dry. TD 2,374 ft.

Grayson County: Jake L. Hamon 1 Hill, R. Merritt Sur., A-821. Dry. TD 5,728 ft.

Quintin Little 1 McGuire, L. G. Purdy Sur., A-979. Dry. TD 8,020 ft.

Jack County: Marine Production Co. 1 Kinder, 825-A-622-TE&L. Dry. TD 5,079 ft.

Marine Production 3 Lindsey, J. N. Wright Sur., A-897. Dry. TD 3,516 ft.

Montague County: Batex Oil Co. 1 Movle Fowler, R. W. Davis Sur., A-181, 1 mile SW production. IP 203 BOPD, ⅜-in., conglomerate pay 6,066 ft. TD 6,210 ft.

V. B. Likins 1 Brite, TE&L Sur. 3426, A-809, 3½ miles SW Bowie. IP 31,000,000 cu. ft. gas, 347 bbl. distillate, open-flow, Viola (?) pay 6-424 ft. TD 6,773 ft.

Osage Exploration Co. 1 Brooks heirs, TE&L Sur. 3432, 3½ miles SW Bowie. IP 4,100,000 cu. ft. gas, open flow, plus 257 bbl. distillate, pay 6,756-64 ft. TD 7,273 ft.

Osage Exploration 1 Teague, R. Howard Sur., A-370, 3 miles SW Bowie, N offset to 1 Brooks. IP 16,000,000 cu. ft. gas, open flow, plus 313 bbl. distillate, pay 6,324 ft. TD 6,717 ft.

Wilbarger County: E. G. Boardman 2-K Waggoner, 17-4-H&TC. Dry. TD 2,404 ft.

G. M. Shanor and C. L. Pardo 1-B Waggoner, 6-5-H&TC. Dry. TD 2,425 ft.

Young County: E. C. Brown et al 1 Boyd Brazell, SPRR Sur. 1, A-268, 1 mile N Sewell field. IP 230 BOPD, 16/64-in., 43°, conglomerate pay 4,110 ft. TD 4,117 ft.

Burk Royalty Co. 1 Burnett, W. H. Brown Sur., A-1865. Dry. TD 4,123 ft.

L. T. Burns 1 Jeffery estate, TE&L Sur. 51, A-327. Dry. TD 5,045 ft.

Doris Brothers 1 Martin, G. W. Cottle Sur., A-65, 4½ miles N Eliasville. IP 312 BOPD, 16/64-in., 44°, Mississippian pay 4,478-90 ft. TD 4,493 ft.

Don McClatchey 1 McClatchy, TE&L Sur. 611, A-702. Dry. TD 511 ft.

E. R. Perkins 1 Wray, J. P. Hume Sur., A-140. Dry. TD 3,305 ft.

WEST TEXAS

Crockett County: Hanco Oil & Gas Co. 1 Noelke, 40-HH-GC&SF. Dry. TD 5,601 ft. Elev. 2,332 ft., reef 5,450 ft.

Southland Royalty Co. 1-14 Todd, 14-WX-GC&SF. Dry. TD 6,625 ft.

A. O. Wellman & Sons 1-77 Parker, 77-1-I&GN. Dry. TD 2,005 ft.

Ector County: Cities Service Oil Co. 1-J Cummins, 9 miles W Goldsmith. IP 569 BOPD, 20/64-in., 43°, Fusselman pay 7,770-96 ft. IP 872 BOPD, 1-in., 46°, Ellenburger pay 8,900-28 ft. TD 8,928 ft.

Phillips Petroleum Co. 2 Ratliff, 3-42-T1S-T&P, 11 miles N Odessa. IP 246 BOPD, ¼-in., 41°, Pennsylvanian 10,620 ft. TD 13,423 ft. New pay in Mac Boring-Wolfcamp field.

Garza County: Head, Alexander & Associates 1 Huntley, 2-SF8369-A1168, 5 miles NW Post. IP 221 BOPD, ½-in., 37°, top pay 3,377 ft. TD 3,340 ft.

Howard County: Russell Maguire 1 Hyman, 59-29-W&NW. Dry. TD 9,215 ft. Elev. 2,391 ft., Ellenburger 8,920 ft.

Kent County: Estill S. Heyser Jr. 1 Lohman, 102-G-W&NW. Dry. TD 7,346 ft. Elev. 2,176 ft., Mississippian 7,312 ft.

Vincent & Welch, Inc. 1 Spires, 22-4-H&GN. Dry. TD 7,313 ft.

Lamb County: George F. Livermore 1 Lingnan, Blk. 65, Labor 17, League 664, State Capitol Land Sur., 1 mile SW extension to Littlefield production. IPP 25 BOPD, pay 3,997-4,025 ft. TD 4,086 ft.

Pecos County: El Paso Natural Gas Co. 1 Eaton, 1-9-H&GN, 5 miles S Grandfalls. IP 2,850,000 cu. ft. gas, plus 20 bbl. distillate per 1,000,000 cu. ft., pay 6,595 ft. TD 7,314 ft.

J. V. Massey 1 Bennett, 6-112-TCRR, 14 miles SW Imperial. IPP 15 BOPD, 30°, pay 2,054 ft. TD 2,320 ft.

Scurry County: Wheelock-Weinschel 1 Sidney Johnson, 265-2-H&TC. Dry. TD 7,505 ft. Elev. 2,238 ft., Mississippian 7,420 ft.

Sutton County: Markham & Cone 1 Aldwell, J. F. Young Sur. 14, Blk. EFD. Dry. TD 755 ft.

Phillips Petroleum Co. 2 Bailey, 21-5-TWNG Sur. Dry. TD 4,798 ft. Elev. 2,472 ft., Ellenburger 4,370 ft.

Tom Green County: Honolulu Oil Corp. et al 1 Nasworthy, A. E. White Sur. 1. Dry. TD 7,680 ft. Elev. 1,930 ft., Strawn 5,330 ft., Ellenburger 6,235 ft., Cambrian 6,960 ft., pre-Cambrian 7,684 ft.

Winkler County: Ralph Lowe 1-C University, 38-21-University Lands, 6 miles SW Wink. IP 4,443,000 cu. ft. gas, 37 bbl. distillate, pay 6,104 ft. TD 10,242 ft.

NEW MEXICO

Sandoval County: Humble Oil & Refining 1 Santa Fe Pacific "B," N½ NW NW 20-14n-1w. Dry. TD 6,016 ft. Quartzite 6,008 ft.

SOUTHEAST NEW MEXICO

Eddy County: Carper Drilling Co. 1-A Carper-Hanson-Superior, 7-25s-30e. Dry. TD 3,637 ft. Elev. 3,173 ft., Delaware sand 3,443 ft.

Carper Drilling 1-B Carper-Hanson-Superior, 12-25s-29e. Dry. TD 62 ft.

Carper Drilling Co. 1-C Carper-Hanson-Superior, 1-25s-29e. Dry. TD 51 ft.

George H. Stracy 1 Kiser, 20-18s-27e. Dry. TD 399 ft.

Lea County: T. J. Sivley 1 Jones-Federal, 14-19s-33e. Dry. TD 5,075 ft.

J. H. Snowden et al 1 Ora Hall, 15-23s-34e. Dry. TD 5,491 ft.

Western Natural Gas Co. 1 Gramling State, 34-16s-35e. IP 216 BOPD, 1-in., 58°, pay 12,310 ft. TD 12,775 ft. W offset to Eidson-Devonian discovery. New pay (?).

ILLINOIS

Clay County: Stewart Oil Co. 1 Valbert, NE SW NE 11-2n-6e. Dry. TD 3,191 ft.

Gallatin County: Felmont Oil Co. 1 Jackson, NE NW SW 24-8s-8e. Dry. TD 2,920 ft.

Marion County: H. R. Pennington 1 Quick, NW NW NW 35-3n-1e. Dry. TD 1,775 ft.

Wayne County: Walter Duncan 1 Harrell, NW SW NE 4-1n-6e. Dry. TD 3,290 ft.

INDIANA

Dubois County: J. L. Knapp 1 Rasche, SE SW SW 22-1s-5w. Dry. TD 750 ft.

Gibson County: C. S. Higgins-Paco 1 Catt, NW NW NE 18-2s-9w. Dry. TD 1,889 ft.

Pike County: Graham Development Co. 1 Johnson, SW NW SW 15-1s-9w. Dry. TD 1,747 ft.

Spencer County: C. Bradshaw 1 Boehn, SE SE SE 24-5s-4w. Dry. TD 745 ft.

Sullivan County: W. E. Marble 1 Knowlin, SE SE SW 19-8n-10w. Dry. TD 953 ft.

Vigo County: T & H Corp. 1 Scamahorn, NW NW SE 36-10n-8w. Dry. TD 1,071 ft.

KENTUCKY

Daviess County: F. H. Rhoades 1 Fullenwieder, N½ NE SW SW 24-Q-31. Dry. TD 1,417 ft.

N. Powell Oil Co. 1 Welch, SE SW SE SW 18-P-30. Dry. TD 1,649 ft.

C. E. O'Neal 1 Inglehart, NW SE SW 6-N-30. Dry. TD 1,781 ft.

Edmonson County: Paul McGinley 1 Elmore, SW NW NW SE 15-H-39. Dry. TD 1,610 ft.

Henderson County: J. D. Turner 1 Bash, SE NW SE SE 19-Q-24. Dry. TD 1,624 ft.

Todd County: G. Harper 1 Smith, SE NE NW 2-G-29. Dry. TD 1,400 ft.

Lewis & Clemens 1 Hart SW SW NW SE 3-C-29. IP 3 BOPD, Silurian 1,268-75 ft. TD 1,310 ft. Extension to Hermon East pool.

Union County: Magnolia Petroleum 1 Beaven, SE SE NE NW 1-O-18. IPP 193 BOPD, Aux Vases 2,914-20 ft., lower Rosiclare 2,867-82 ft. TD 3,036 ft. Discovery of Shanks pool.

Webster County: Chas. Morburger 1 Rhea, SW NE NW NW 4-K-20. IPP 40 BOPD, Aux Vases. TD 1,677 ft. Discovery of Black Ford pool.

MICHIGAN

Clinton County: Associated Drillers & Producers, Inc. 1 Fitzpatrick, NE NW SE 2-8n-4w. Dry. TD 2,672 ft. in Traverse lime

Jackson County: Michigan Oil & Gas Drilling Co. 1 Reed, SE SE SE 13-4s-2w. Dry. TD 1,520 ft. in Traverse lime.

Kent County: H. J. Hirzel 1 Lauer, NE NW NW 5-7n-12w. Dry. TD 2,455 ft. in Dundee.

Muskegon County: J. W. Lang Co. 1 Svoboda-Edwards et al, NE NE SW 3-9n-15w. Dry. TD 1,868 ft. in Traverse lime.

Washtenaw County: Sun Oil Co. 1 Hinderer, NE NW NE 36-2s-3e. Dry. TD 1,441 ft. in Dundee.

WEST VIRGINIA

Webster County, Glade district: Gregory Gas Co. 1 J. W. Mills, elevation 2,325 ft., 1,205,000 cu. ft. gas, Maxon sand 1,469 ft., gas 1,472 ft., TD 1,533 ft.

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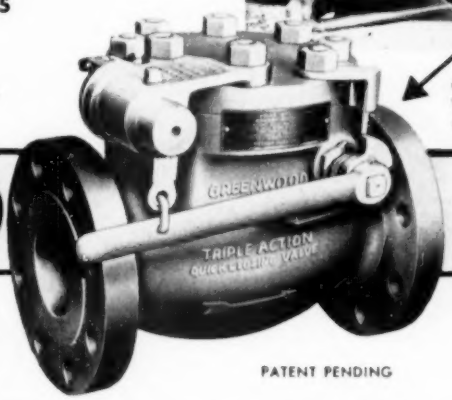

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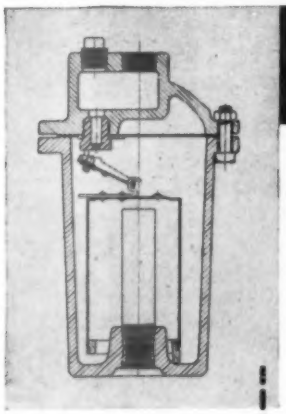

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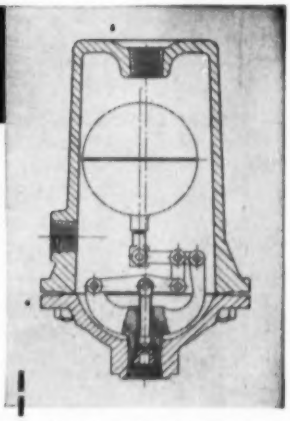

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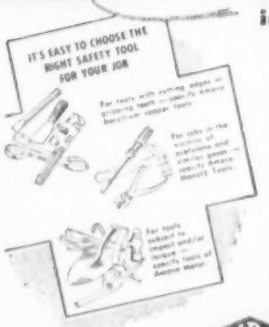

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WILDCAT COMPLETIONS

ALABAMA

Clarke County: Gulf Refining Co. 1 Neal et al, C SW NE 30-7n-4e. Dry. TD 6,152 ft. Elev. 242 ft., lower Cretaceous 5,554 ft.

Escambia County: Como Drilling Co. 1 Atmore Prison Farm, C SW NE 21-2n-6e. Dry. TD 6,710 ft. Elev. 204 ft., marine Tuscaloosa 6,056 ft., lower Tuscaloosa 6,302 ft., Massive 6,456 ft.

MISSISSIPPI

Adams County: Petersen Drilling Co. 1 Hopkins, 20-5n-1w. Dry. TD 7,028 ft. Elev. 187 ft., Wilcox 4,605 ft., base Baker shale 6,381 ft., Minter zone 6,703 ft.

Serio-Punches 1 Vaughn estate, 15-5n-2w. Dry. TD 7,010 ft. Elev. 145 ft., Wilcox 4,691 ft., base Baker shale 6,454 ft., Walker zone 6,700 ft.

Marion County: Latimer-Proctor and Petersen Drilling Co. 1 Mississippi Training School, 27-4n-18w. Dry. TD 9,296 ft. Elev. 225 ft., Wilcox 3,133 ft., marine Tuscaloosa 9,260 ft.

Monroe County: Vaughey & Vaughey 1 Monroe County, NE SE SE 16-14s-17w. Dry. TD 5,034 ft. Elev. 281 ft., Mississippi 2,142 ft., Iowa 3,290 ft., Devonian 3,580 ft., Ordovician 4,048 ft.

Wayne County: Walter E. Sistrunk 1 Smith, 23-6n-7w. Dry. TD 6,514 ft. Elev. 207 ft., Wilcox 1,727 ft., Eagle Ford 6,208 ft., Tuscaloosa 6,443 ft.

SOUTH LOUISIANA

Acadia Parish: Union Sulphur & Oil Corp. 2 Daigle, 74-8s-2e. IP 146 BCPD and 2,274 M.c.f. daily, 6/64-in., 47.7°, perforations 10,627-32 ft. TD 10,750 ft. (Extends Church Point field.)

Beauregard Parish: American Republics Corp. 1 Long Bell, 21-5s-9w. Dry. TD 8,900 ft.

Austral Oil Exploration Co., Inc., 1 Long Bell, 20-5s-8w. Dry. TD 8,750 ft.

Vincent & Welch, Inc. 1 Long Bell, 24-5s-7w. Dry. TD 7,455 ft.

Iberia Parish: Cities Service Oil Co. 1 Mestayer, 32-11s-8e (Fausse Point area). Dry. TD 10,868 ft.

Lafayette Parish: Bates & Cornell 1 Martin, 35-9s-3e. IP 300 BOPD, 12/64-in., 34°, Frio-Richard 10,560-70 ft. (perforations). TD 11,082 ft. (New field.)

St. Landry Parish: Pan American Production Co. 1 Lavergne, 26-7s-3e. IP 4,500 M.c.f. daily with 20 BC per M.M. c.f.m. ¾-in., 46°, Frio-Tweedel 10,897-910 ft. (perforations). TD 11,242 ft. (Extends Shuteston field.)

St. Mary Parish: Shore Exploration Co. 1 South Coast, 39-14s-10e. Dry. TD 7,865 ft.

Union Oil Co. of California 1 Citrus, 2-18s-11e. Dry. TD 11,505 ft.

Vermilion Parish: Houston Oil Co. of Texas 1 Gochaux, 88-14s-3e. IP 374 BOPD, 10/64-in., 34.1°, perforations 12,334-40 ft. TD 13,435 ft. (New field—Live Oak Plantation.)

NORTH LOUISIANA

Tensas Parish: Carter Oil Co. and Interstate Natural Gas Co. 1 Sibley, near SWc of frac. Sec. 21-11n-12e. IPF 36 BOPD, Tuscaloosa massive sand 9,156-67 ft., ¾-in. TD 9,662 ft. (Discovery tentatively called South St. Joseph pool).

ARKANSAS

Ouachita County: Jones-O'Brien, Inc. and N. B. Hunt 1 Myar heirs, C NW SE 18-15s-17w. Dry. TD 5,766 ft.

Union County: Burnett Producing Co. 1 Olin Industries "A," C NE SW NW 3-18s-14w. Dry. TD 3,811 ft.

OKLAHOMA

Grant County: Davis and Wharton Drilling Co. 1 Cole, SW NE NW 31-28n-3w. IP 6,140 M.c.f. of gas per day, Cherokee 4,518-42 ft. TD 5,154 ft. (Gas discovery.)

Jackson County: J. V. Russell et al 1 Holt, NW NW SE 21-1n-19w. Dry. TD 2,823 ft.

Okfuskee County: Davis et al 1 Beets, NE NE NW 36-13n-10e. IPP 30 BOPD, lower Dutcher 2,685-96½ ft., 39°, TD 2,696 ft. (Oil discovery.)

Texas County: United Carbon 9 Kelley, C NE SW 2-4n-10eCM. IP 5,200 M.c.f. of gas per day, Shawnee 2,932-46 ft. TD 5,050 ft. (New pay in Panhandle and Northwest Eva pool.)

Tillman County: Union Oil Co. of California 1 Jones, SW SW NE 4-4s-16w. TD 5,622 ft.

KANSAS

Clark County: The Texas Co. 1 Moore, NW NW SW 25-31s-22w. Dry. TD 6,607 ft.

Dickinson County: E. K. Carey 1 Lauxman, SE NW NE 31-16s-1e. Dry. TD 2,706 ft.

McPherson County: Trans Era Corp. et al 1 Neel, NE SW NE 30-19s-5w. IPP 175 BOPD, Mississippian 3,411-18 ft. TD 3,418 ft. (Opens Windom pool.)

Norton County: Trans Era 1 King, SW SW SE 17-3s-24w. Dry. TD 3,675 ft.

Rooks County: Lohman & Johnson 1 Westusin, SW NW NW 27-9s-17w. Dry. TD 3,690 ft.

Rush County: Bay Petroleum and Strain 1 Dechant, SE SE SE 20-16s-18w. Dry. TD 3,581 ft.

Russell County: Nadel & Gussman 1 Elasser,

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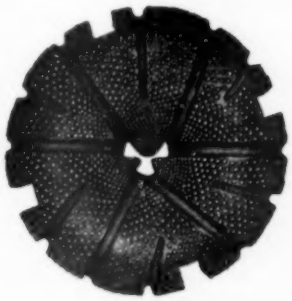

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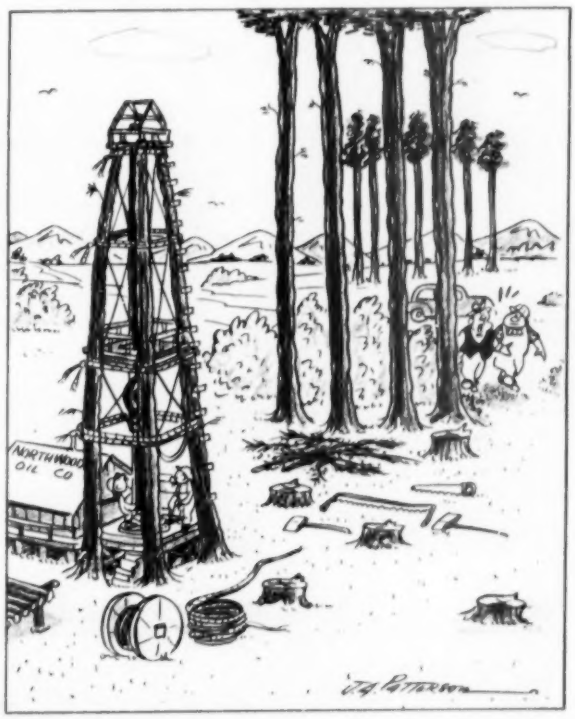
TRUCO DIAMOND BITS
AND D & S CORE BARRELS



OF OIL AND GAS JOURNAL

"I hear it's hard to get equipment up here."

WILDCAT COMPLETIONS

SW SW SW 14-12s-15w. Dry. TD 3,224 ft.

Sheridan County: Virginia Drilling Co. 1 Gulick, NE NE SW 4-8s-26w. Dry. TD 4,613 ft.

NEBRASKA

Kimball County: Harry Royster 1 H. Long, NE NW SW 25-13n-55w. Dry. TD 6,331 ft. "J" sand 6,278 ft.

NORTH DAKOTA

Cavalier County: Los Nietos 1 Walter Heard, SW 16-159n-59w. Dry. TD 1,410 ft.

Towner County: Los Nietos 1 J. Damberger, SE 25-158n-65w. Dry. TD 1,337 ft.

CALIFORNIA

Fresno County: Franco Western Oil Corp. 1 Shields, 4-16s-15e. Dry. TD 7,748 ft.

Glenn County: General Petroleum Corp. 1 Navarro, 26-19n-2w. Dry. TD 5,406 ft.

Imperial County: Campbell, Egger & Rottman 1 Federal, 6-11s-21e. Dry. TD 1,320 ft.

Kern County: Honolulu Oil Corp. 4 Honolulu - Watson - CCMO, 23-30s-21e. Dry. TD 7,170 ft.

Intex Oil Co. 3 Gill, 24-26s-27e, Vedder 2,120 ft. Dry. TD 2,146 ft.

Standard Oil Co. of California 69 1-Y, NW NE 1-30s-21e, IPP 15 BOPD and 145 BWPD, 24° gravity, perfs. 420-678 ft., TD 1,640 ft. (New shallow oil pool discovery in Cymric area.)

Standard Oil Co. of California 14 Galbreath, 20-26s-21e. Dry. TD 4,050 ft.

Standard Oil Co. of California 6 Tejon Ranch-3, 29-11n-18w. Dry. TD 1,977 ft.

Kings County: Reserve Oil & Gas Co. 24-20 Mitchel-West Slope, 20-24s-18e. Dry. TD 1,616 ft.

Los Angeles County: The Texas Co. 2 Eadie, 23-3n-16w. Dry. TD 4,297 ft.

The Texas Co. 1 Long Beach Airport, 20-4s-12w, IPF BOPD, 16/64-in. choke, 32° gravity, perfs. 9,063-65 ft., TD 13,016 ft., PB 9,300 ft. (About ½ mile northeast extension to Desoto pool of Long Beach field.)

Merced County: Richfield Oil Corp. 1 Valley Agricultural, 7-8s-15e. Dry. TD 3,753 ft.

San Benito County: Standard Oil Co. of California 3-2 Eade, 2-19s-9e. Dry. TD 1,850 ft.

Santa Cruz County: The Texas Co. 1 J. H. Blake, 12-11s-1e. Dry. TD 7,522 ft.

Solano County: Shell Oil Co. 1 Unit-A, SW SW 6-4n-1e, IPF 6,250 M.c.f. gas per day, ½-in. choke, perfs. 4,260-85 ft., TD 5,150 ft. (About ½ mile north extension to North Kirby Hills field.)

MONTANA

Carbon County, E. Dry Creek: Mule Creek Oil 1 Government-Smith, C NW NE 18-7s-22e. Dry. TD 6,195 ft. Morrison 6,170 ft.

WYOMING

Natrona County, Anderson Draw: Husky Oil 1 Government, C NE SW 23-37n-83w. Dry. Tensleep 4,089 ft. TD 4,191 ft.

Niobrara County, South Cheyenne River: Delta Drilling 1-A Delta-Williston Government, C NE NE 6-39n-66w. Dry. TD 8,584 ft. Dakota 8,554 ft.

Cheyenne River area: Vickers Exploration, Ltd. 1 Government, C NE NE 32-41n-66w. IPF 500 BO 20 hours, Newcastle discovery (new field). Newcastle sand 7,643-56 ft. TD 7,765 ft.

Park County, Heart Mountain: Jewell Oil & Gas 1 Bea-Government, NE SE NE Lot 6-18-54n-102w. Dry. TD 2,321 ft. 3rd Frontier 2,232 ft.

Weston County, Sherwin Ranch: Dakamont Exploration 1 Government, C NE SE 21-41n-67w. IPF 20 BOPH, Newcastle discovery. Newcastle pay 8,111-37 ft. TD 8,205 ft.

UTAH

Emery County, Huntington Anticline Unit: Phillips Petroleum 1 Unit S½ SE NW 15-17s-8e(SLM). Dry. TD 11,250 ft. Mississippian 10,095 ft.

COLORADO

Baca County: Amerada Petroleum 1 "A" State, NE NE SW 36-33s-42w. Dry. TD 5,100 ft. Mississippian 5,024 ft.

Logan County: Plains Exploration 1-C State, NW NW NW 21-8n-54w. IPP 110 BO, 10 hours through 16/64-in. choke, "J" sand discovery (new field). "J" sand 5,277 ft. TD 5,390 ft.

Vaughey & Vaughey 1 Hamil, C NW SE 19-9n-52w. Dry. TD 4,884 ft. Skull Creek 4,818 ft.

British-American 1 "B" Ramey, C SW NW 11-9n-53w. Dry. TD 4,942 ft. "J" sand 4,822 ft.

Morgan County: Carmack & Crawford 1 Evans, SW SW SW 27-11n-55w. Dry. TD 5,070 ft. "J" sand 4,891 ft.

Eddie Fisher 1 Scott, SE SE SE 32-1n-58w. Dry. TD 6,068 ft. Skull Creek 6,050 ft.

Eddie Fisher 1 Casper, NE NE NE 34-1n-58w. Dry. TD 6,135 ft. Skull Creek 6,115 ft.

New Drilling 1 Bass, NE NE NW 11-2n-56w. Dry. TD 5,228 ft. Skull Creek 5,250 ft.

(Continued on page 183)

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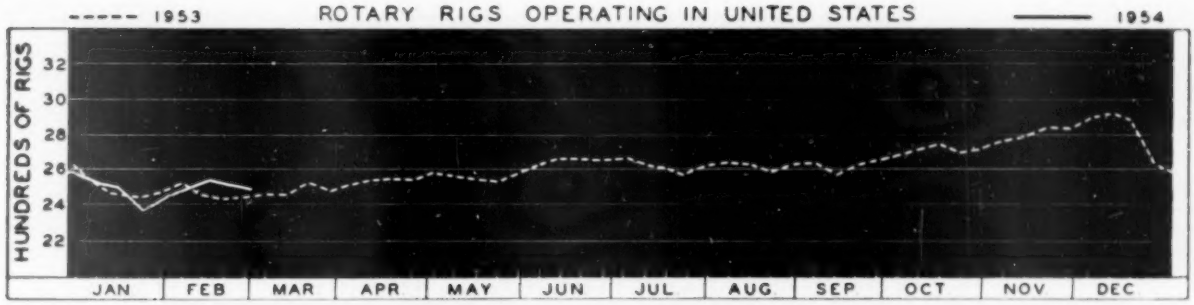
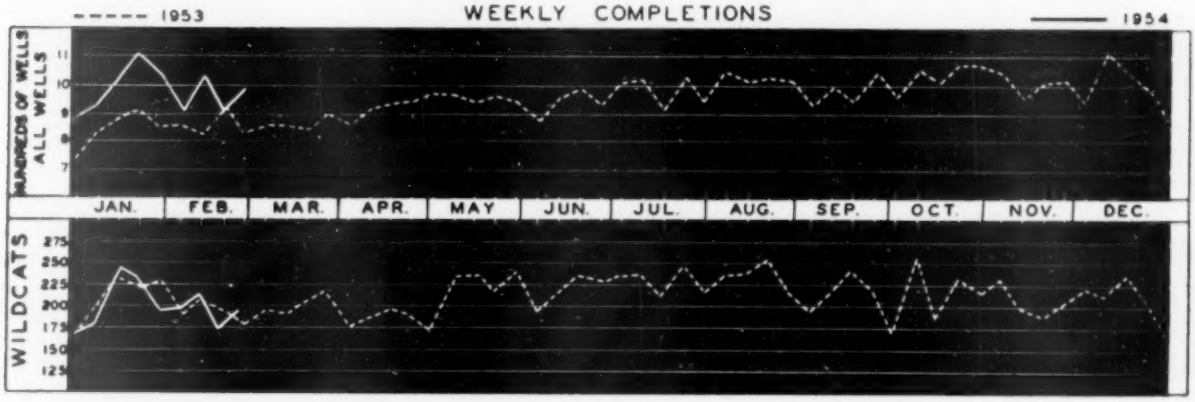




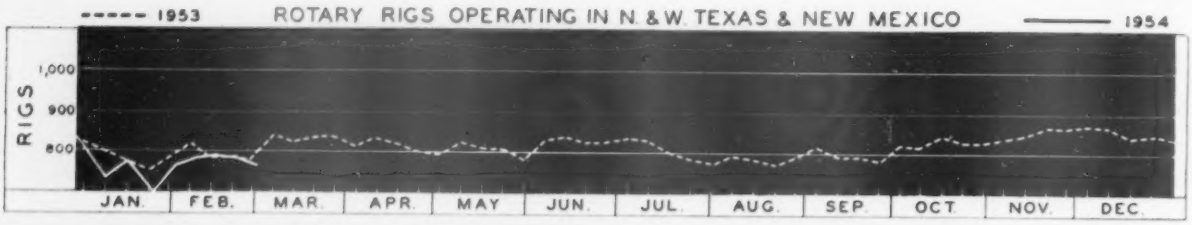
CURRENT STATISTICS

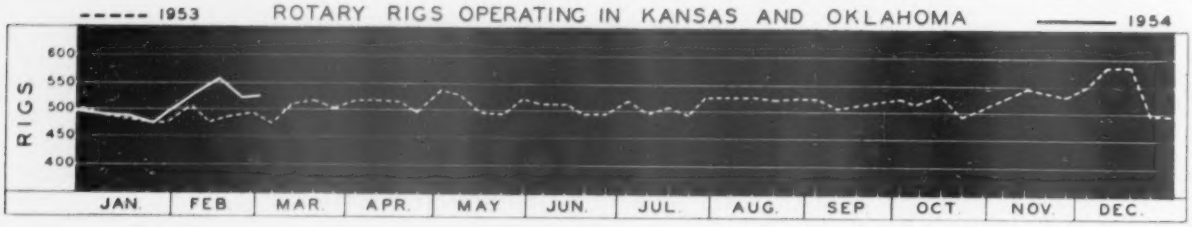
EXPLORATION

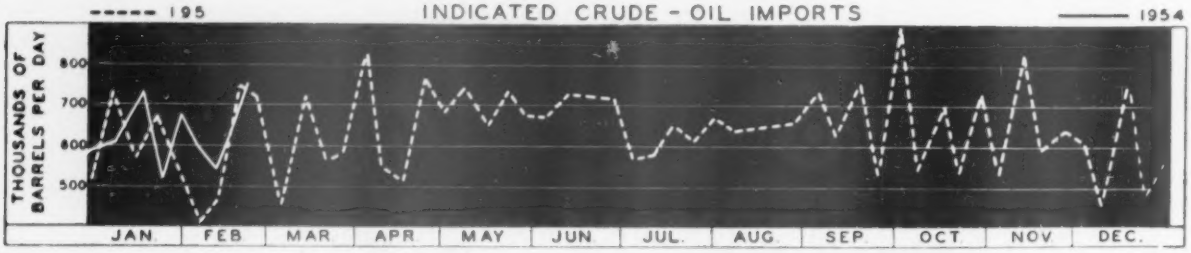
WEEKLY WELL COMPLETIONS . . . WEEK ENDED FEBRUARY 27, 1954

	Total of all wells					Feb. 27		Wildcat completions and discoveries					Cumulative total, 1954				
	Comp.	Oil	Gas	Dry	Footage	1954	1953	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Pennsylvania-New York	47	18	10	*19	76,127	392	354	0	0	0	0	0	0	0	1	6	7
West Virginia	12	0	11	1	39,070	87	82	0	0	1	0	1	0	0	4	3	7
Ohio	23	10	5	§8	57,558	151	154	0	0	0	0	0	0	0	2	1	3
Indiana	19	4	0	15	27,782	115	203	0	0	0	6	6	0	0	0	25	25
Kentucky	20	9	0	11	34,184	171	162	3	0	0	6	9	4	0	0	22	26
Illinois	46	29	1	16	119,696	425	309	0	0	0	4	4	0	0	0	72	72
Michigan	9	1	0	8	20,073	105	93	0	0	0	5	5	0	0	0	48	48
Kansas	83	53	4	‡26	292,376	694	750	1	0	0	7	8	7	0	2	86	95
Nebraska	6	3	0	3	36,295	58	47	0	0	0	1	1	4	0	0	15	19
Oklahoma	168	119	7	‡42	583,520	1,543	1,122	1	0	2	2	5	19	2	5	103	129
Texas	357	209	21	127	1,607,169	2,860	2,603	16	2	5	68	91	130	15	28	681	854
North Central (Dist. 7-B & 9)	149	86	2	61	476,224	1,034	950	6	2	1	30	39	70	2	2	266	340
West (Dist. 7-C & 8)	69	54	2	13	409,583	660	604	6	0	1	10	17	33	0	3	128	164
Panhandle (Dist. 10)	9	6	3	0	26,997	143	135	0	0	0	0	0	0	0	2	11	13
Eastern (Dist. 5 & 6)	18	6	5	7	101,999	111	121	1	0	0	5	6	3	0	3	30	36
Gulf Coast (Dist. 2 & 3)	48	29	4	15	313,422	473	380	3	0	2	10	15	13	6	9	117	145
Southwest (Dist. 1 & 4)	64	28	5	31	278,944	439	413	0	0	1	13	14	11	7	9	129	156
Louisiana	48	28	4	16	373,925	556	454	3	1	0	6	10	16	8	5	48	77
Northern	19	11	4	4	93,962	294	211	1	0	0	0	1	3	0	0	11	14
Southern	29	17	0	12	279,963	262	243	2	1	0	6	9	13	8	5	37	63
Arkansas	19	16	0	3	53,720	124	78	1	0	0	2	3	5	0	0	16	21
Mississippi	13	6	1	6	93,826	60	70	0	0	0	5	5	2	0	0	21	23
Southeastern States	3	0	0	3	18,897	22	24	0	0	0	2	2	1	0	1	16	18
Montana	5	3	0	2	30,049	48	71	0	0	0	1	1	1	0	0	13	14
Wyoming	19	15	0	4	103,110	258	97	2	0	0	3	5	9	0	1	33	43
Colorado	21	8	0	13	115,377	165	87	2	0	0	7	9	6	0	0	67	73
Utah	2	1	0	1	16,970	10	11	0	0	0	1	1	0	0	0	4	4
New Mexico	25	8	8	9	129,680	222	215	1	0	0	7	8	2	0	1	32	35
California	51	34	2	15	269,630	399	414	2	0	1	12	15	14	0	4	83	101
North Dakota	3	1	0	2	11,241	35	44	0	0	0	2	2	1	0	0	10	11
Miscellaneous	0	0	0	0	0	6	11	0	0	0	0	0	0	0	0	6	6
Total United States	999	575	74	350	4,110,275	8,506	§7,455	32	3	9	147	191	221	25	54	1,411	1,711
Total previous week	912	506	72	334	3,863,037			17	1	7	149	174	189	22	45	1,264	1,520
Total February 28, 1953	836	440	47	349	3,465,738			24	2	8	145	179	229	20	52	1,422	1,723

Service wells included: *17, 13, ‡2. §Revised.





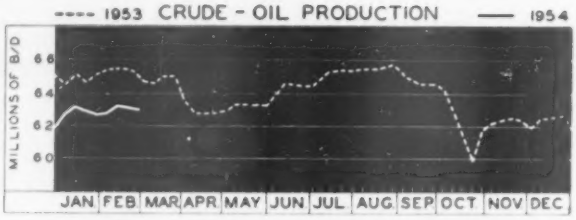


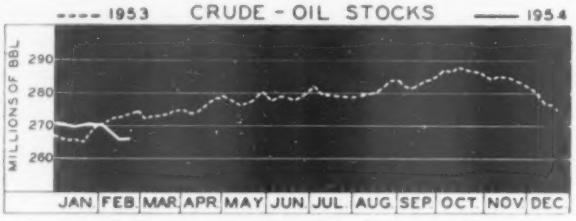
DAILY AVERAGE PRODUCTION FOR WEEK

	February 27 Crude oil	February 27 Lease condensate	February 27 Total	Feb. 20 total
Alabama	4,300		4,300	4,300
Arkansas	74,800	550	75,350	75,500
California	1,001,800		1,001,800	1,003,300
Colorado	114,400		114,400	113,600
Eastern	58,000		58,000	58,200
Florida	1,450		1,450	1,450
Illinois	177,500		177,500	175,500
Indiana	31,300		31,300	31,000
Kansas	306,500		306,500	329,300
Kentucky	34,700		34,700	33,700
Louisiana	628,450	46,800	675,250	672,400
North	108,450	3,800	112,250	109,400
South	520,000	43,000	563,000	563,000
Michigan	33,700		33,700	33,400
Mississippi	88,600	3,800	92,400	92,550
Montana	35,600		35,600	35,400
Nebraska	18,800		18,800	18,700
New Mexico	203,800	1,675	205,475	205,575
Oklahoma	521,200		521,200	520,300
Texas	2,612,400	53,000	2,665,400	2,665,400
Dist. 1	39,900	575	40,475	40,475
Dist. 2	134,800	7,800	142,600	142,600
Dist. 3	414,000	25,000	439,000	439,000
Dist. 4	239,500	6,300	245,800	245,800
Dist. 5	38,200	450	38,650	38,650
Dist. 6	108,500	5,700	114,200	114,200
East Texas field	227,000		227,000	227,000
Dist. 7-B	125,000	75	125,075	125,075
Dist. 7-C	175,000	4,850	179,850	179,850
Dist. 8	845,000	1,700	846,700	846,700
Dist. 9	185,000	500	185,500	185,500
Dist. 10	80,500	50	80,550	80,550
Utah	4,450		4,450	4,300
Wyoming	233,600		233,600	232,100
North Dakota	14,700		14,700	14,400
Total U. S.	6,200,050	105,825	6,305,875	6,320,375
Change from previous week, down			14,500	
Canada	292,800		292,800	262,750

Total U. S. production January 1-February 27 365,444,475 bbl.
Same period last year (crude plus cond.) *380,381,445 bbl.

*Includes 5,308,025 bbl. condensate.





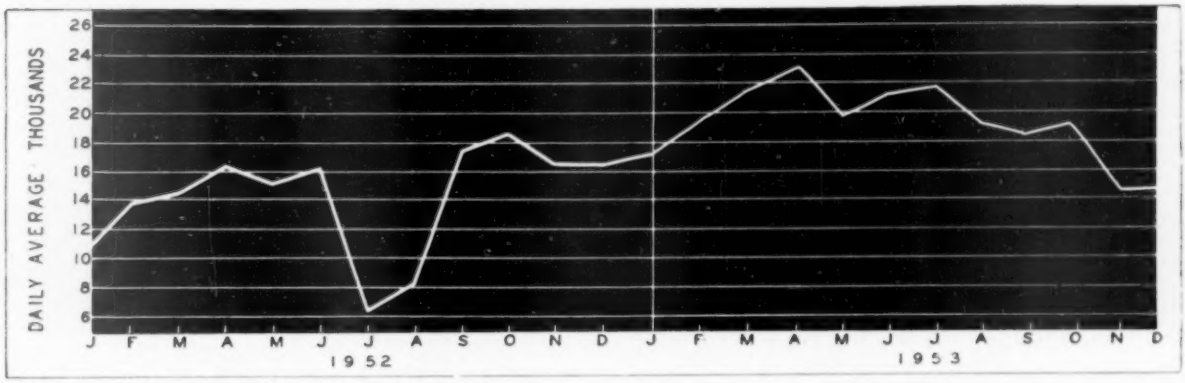
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

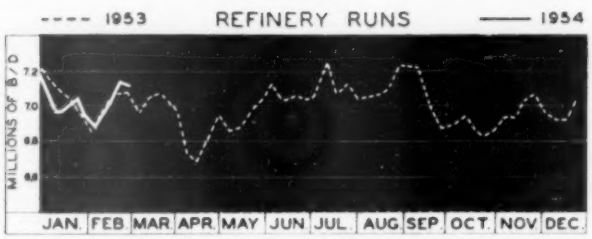
(Thousands of barrels)

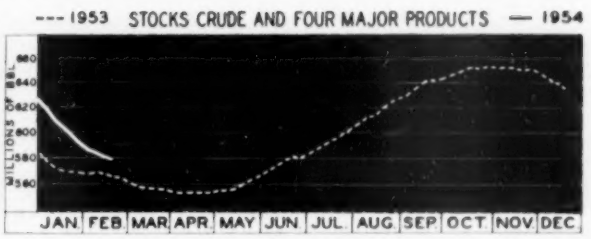
	Feb. 20, '54	Feb. 13, '54	Feb. 21, '53
Pennsylvania Grade	2,681	2,576	2,207
Other Appalachian	1,914	1,609	2,051
Illinois, Indiana, Michigan	11,864	11,604	9,873
Arkansas	3,012	3,280	3,033
Louisiana	14,552	14,932	16,117
North	2,473	2,634	2,770
Gulf	12,079	12,298	13,347
Mississippi	3,285	3,370	3,569
New Mexico	8,151	8,131	7,681
Oklahoma and Kansas	36,606	36,895	35,835
Texas	122,335	123,844	135,878
East Texas	10,795	11,122	11,255
West Texas	52,769	53,143	64,786
Texas Gulf	25,311	25,871	25,670
Other Texas	33,460	33,708	34,167
Rocky Mountain	16,675	16,455	16,159
California	33,292	33,218	32,401
Foreign	†11,849	10,189	7,577
Total	266,216	266,103	272,381

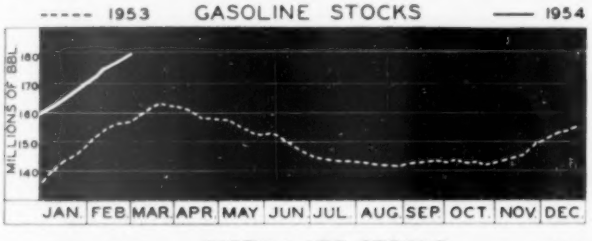
*Bureau of Mines. †Includes 3,269,000 bbl. in California.

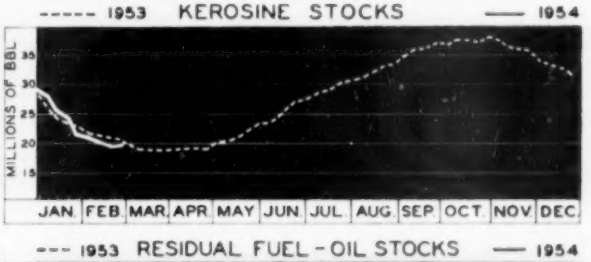
MOTOR-VEHICLE SALES (DOMESTIC MARKET)

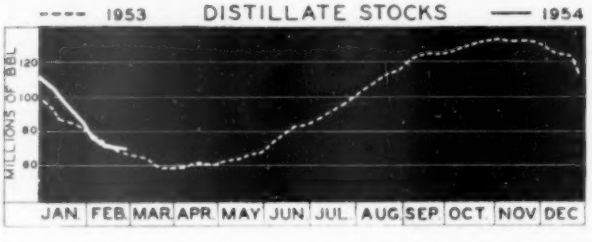


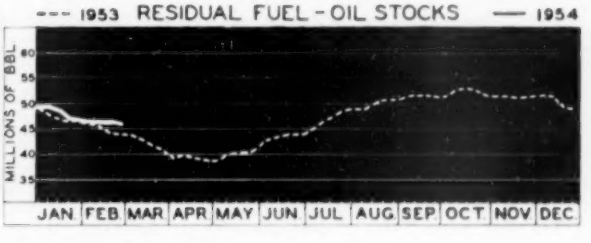










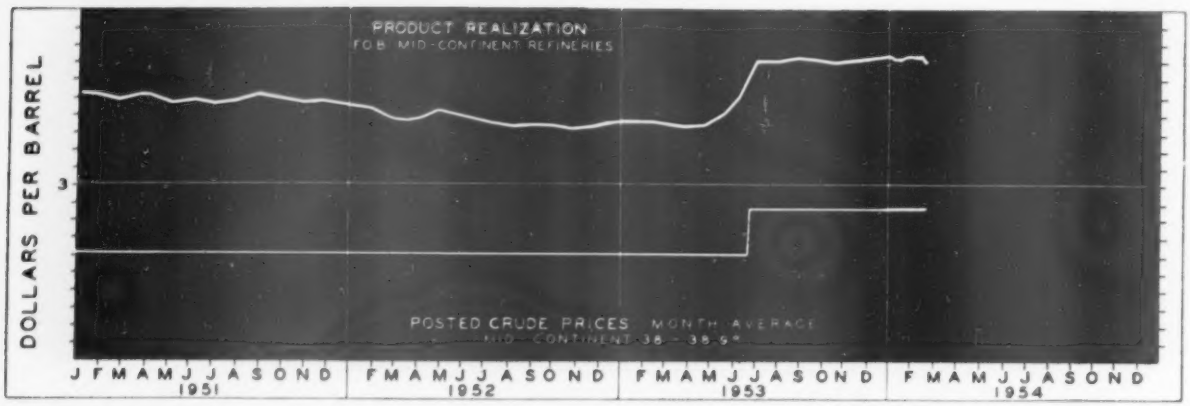


A.P.I. REFINERY REPORT, FEBRUARY 27

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks† Gaso.‡	Kero.	Dist.	Resid.	Bureau of Mines, February 1953 — Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,022	425.0	52.7	263.4	230.6	35,105	8,088	24,742	9,284	973	383.9	41.5	252.4	245.5
Appalachian:														
District 1	119	49.6	9.4	17.4	13.4	4,405	490	1,156	656	109	45.1	4.7	19.3	15.0
District 2	98	49.4	6.7	17.3	13.9	1,984	412	488	212	82	39.1	5.1	14.0	20.2
Ind., Ill., Ky.	1,339	723.3	75.4	273.7	186.1	39,617	4,615	11,302	4,495	1,252	664.9	84.4	232.8	196.9
Okla., Kans., Mo.	575	343.6	19.4	145.3	43.0	19,457	1,071	7,143	1,072	556	310.6	13.6	134.5	68.4
Inland Texas	233	167.1	12.0	39.4	30.6	7,227	287	1,126	1,229	251	176.1	15.2	40.2	41.2
Texas Gulf Coast	1,744	794.3	153.3	412.4	243.8	25,282	2,207	6,026	5,274	1,645	740.0	137.9	421.3	255.8
La. Gulf Coast	599	281.7	82.3	124.0	51.6	10,897	1,416	3,020	1,190	530	214.6	49.0	154.8	60.3
N. La. and Ark.	92	39.7	9.2	25.0	7.4	4,103	416	982	95	79	35.5	7.2	20.4	6.8
Rocky Mountain:														
New Mexico	20	13.3		2.9	2.9	207		30	29	17	10.6	0.5	2.5	3.9
Other Rocky Mtn.	249	130.7	4.7	57.4	40.8	7,946	180	1,997	828	217	99.2	6.9	48.8	47.7
California	1,033	483.9	2.6	167.2	411.3	22,940	324	11,125	21,577	962	389.5	4.4	187.1	360.8
Feb. 27, 1954	7,123	3,501.6	427.7	1,545.4	1,275.4	179,170	19,506	69,137	45,941	6,673	3,109.1	370.4	1,528.1	1,322.5
Feb. 20, 1954	7,156	3,512.1	445.7	1,568.9	1,224.7	177,364	19,421	69,728	46,215					
Feb. 28, 1953	7,090	3,337.1	419.3	1,542.3	1,288.1	157,612	20,550	68,025	44,432					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953
F M A M J J A S O N D
1954

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.69 for week ended February 20, $3.76 for previous week, and $3.37 for February 1953. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of March 3, 1954. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.75-11	11.75-12.25	10.25-10.50
Premium gasoline	11.75-12	13.25-14	11.75-12.25
42-44 w.w. kerosine	9.125-9.375	10.65-10.9	9.5-9.75
No. 2 straw fuel oil	8.25-8.375	9.65-9.9	8.5-8.75
No. 6 residual	$1.30-1.45	$2.20-2.40	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.0	4.5	4.75
Grade 18-55	6.0	5.5	5.75

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	12.5
750 vis., No. 3-4 neutral	15.5
2,000 vis., 5-6 neutral	17

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	19
200 vis., No. 3 neutral, 0-10 pp.	14.25

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5
180 vis., 10 p.t. neutral	22.5

WAX
Mid-Continent

132-134 A.M.P.	6.0

SEASONAL additions to gasoline inventories that are establishing all-time records each week for total gasoline stocks keep a continuing pressure on gasoline markets. The past record for finished and unfinished gasoline stocks was set at 163,324,000 bbl. in the week ended March 21, 1953. The new record came with stocks reported at 165,551,000 bbl. on January 9 of this year. The total had climbed to 177,364,000 by February 20, and at least 5,000,000 bbl. more may be added by the end of March.

The only shifts in gasoline prices in the past week have been some reductions in formal postings by suppliers who have held nominal quotations above the levels at which the spot sales are actually being made. Some suppliers are still quoting 12.125 cents a gallon for barge deliveries of unbranded regular gasoline in New York Harbor, but reports indicate that material is readily available at 11.75 cents. Refiners on the Gulf Coast need either shipping instructions for gasoline or extra tanks to store the surplus.

Weekly figures indicate that almost all of the gain in gasoline stocks for the Gulf-East Coast districts has been on the Gulf Coast. Gasoline inventories in Texas Gulf and Louisiana Gulf districts were up 8,043,000 bbl. from last year on February 20 compared with a decrease of 215,000 bbl. in the East.

The market pressure that resulted in a voluntary allowance of 0.25 cent a gallon off posted prices for barge deliveries of kerosine and No. 2 fuel in New York Harbor may be removed by the colder weather expected by the last of the first week of March. Combined inventories of kerosine and distillate fuels for the Gulf-East Coast districts on February 20 were 3,764,000 bbl. less than last year compared with a reduction of 3,714,000 bbl. for all areas of the country. The gains in residual stocks have been on the West Coast.

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87	....	....	....
15-15.9	1.93	....	....	....
16-16.9	1.99	....	....	....
17-17.9	2.05	....	....	....
18-18.9	2.11	....	....	....
19-19.9	2.18	....	....	....
20-20.9	2.24	$2.50	....	$2.37
21-21.9	2.30	2.52	....	2.39
22-22.9	2.37	2.54	....	2.41
23-23.9	2.45	2.56	....	2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9	....	2.76	3.09	2.63
34-34.9	....	2.78	3.11	2.65
35-35.9	....	2.80	3.13	2.67
36-36.9	....	2.82	3.15	2.69
37-37.9	....	2.84	3.17	2.71
38-38.9	....	2.86	3.19	2.73
39-39.9	....	2.88	3.21	2.75
40 and above	....	2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast ‡Includes New Mexico Permian.

Prices East of California effective June 15, 1953. California prices effective February 16, 1953. Pennsylvania Grade prices effective January 1, 1954.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.76
Middle District	3.70
Southwest Pennsylvania	3.31
West Virginia	3.25
Ohio	3.24
Illinois Basin	3.02

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HELP WANTED

OIL INDUSTRY Employment Service. Tom Robinson, owner, 405 Tuloma Bldg., Tulsa, Oklahoma. For technical and trained oil industry personnel. Write for blank.

WANTED: Graduate Petroleum Engineer with varied experience in completion and reservoir work by independent oil company. Give full particulars of experience and salary expected in first reply. Box G-969, The Oil and Gas Journal, Tulsa, Oklahoma.

INDUSTRIAL SALES REPRESENTATIVE

Integrated oil company has excellent opportunity for qualified applicant. Position requires experience and knowledge of manufacture and sale of all industrial petroleum products including Naphthas and Solvents. Constant travel in the following states required: Illinois, Indiana, Southern Michigan, Western Ohio, and Northeast Missouri. All replies should contain work history, salary required, and recent photograph. Box G-960, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE MANAGER

Independent production firm in Oklahoma desires experienced manager to act in capacity of president of company. Must be experienced executive in all phases of petroleum industry — others need not apply. Salary commensurate with ability and position. Complete information in application should include age, marital status, detailed experience and education.

Box G-984
The Oil and Gas Journal
Tulsa, Oklahoma

OVERSEAS POSITION GEOLOGIST

Roving overseas assignment with Standard Oil Company (New Jersey) available for qualified geologist. Will consider geologist with B.S. or M.S. degree, inexperienced recent graduate to several years professional experience. Age 21-28, unmarried.

Will be required to assist in reconnaissance geological surveys to evaluate areas of interest. Position available immediately.

Write giving details of personal data, education and experience.

Box 308-P
RADIO CITY STATION
New York 19, N. Y.

HELP WANTED

INSTRUMENT ENGINEER

Expanding instrument manufacturer has opening for instrument engineer with at least seven years experience, preferably in manufacturing and assembly of industrial instruments. For the right man this job could lead to managerial position. Must be aggressive, capable supervisor, and willing to assume responsibility. Age 30-40. Salary open. Apply to Industrial Instrument Corporation, P. O. Box 1909, Odessa, Texas.

CHIEF CHEMIST experienced in Pod column work and gasoline plant process and product control testing to take charge of laboratory located at large gasoline plant in West Texas. Housing furnished and salary to be commensurate with qualifications of applicant. Please furnish experience record and salary expected. Our employees have been notified of this advertisement. Box G-776, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST

With at least five years subsurface experience in Oklahoma for responsible position with active oil producing company in Tulsa. Excellent opportunity for advancement in compact organization. Write full particulars of education and experience to Box G-961, The Oil and Gas Journal, Tulsa, Oklahoma.

SALESMAN

We need a top flight engine salesman for Mid-Continent area. Unusual opportunity. Requirements: Age 30-50, technical background, pleasing personality, administrative ability. Give personal and business references, experience, salary required. Address confidentially: General Sales Manager

Climax Engine & Pump Mfg. Co.,
208 So. LaSalle St.
Chicago 4, Illinois

PUBLIC UTILITY ENGINEER

Large, long established natural gas company in the West has an opening for an experienced senior staff engineer; one who under the management can plan and supervise the preparation of regulatory and rate matters, personally testify before commissions and assist the management in problems of utility operations. It is essential that the applicant understand gas distribution and transmission operations, have a comprehensive knowledge of public utility requirements and experience in processing matters before commissions or public bodies. Position is permanent and salary is open.

All replies will be confidential with the executive head of the company.

Box G-933
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

PHOTOGEOLOGIST—To head photogeolic interpretation section. Must be College graduate—5 years experience—mining experience desirable. Write giving age, education, and full details of experience. All replies confidential. Box G-968, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED OPERATORS & MAINTENANCE MEN for new small refinery being completed March 1954. Texas MEK deoiling process. Send statement of qualifications to P.O. Box 863, Salt Lake City, Utah

EXPLORATION MANAGER

Must have 5 years' Executive Geological Background and extensive Lease Trading experience.

SALARY: to $20,000

This position is with a well established Independent Oil Company.

CHAS. J. LOVELESS, Personal Service
616 S. Main Tulsa, Oklahoma

Male Help Wanted

Mechanical Foreman with complete knowledge of the maintenance functions of a refinery; five to seven years' experience in machine shops and on repairs of mechanical equipment, e.g. pumps, compression turbines, etc. Job location is in Canada.

Reply giving details of age, marital status, education, salary expected and experience to

Box G-979
The Oil and Gas Journal
Tulsa, Oklahoma

MANAGER
New Oil Field Equipment Supply Co.

The organizers of a new oil field supply corporation are seeking an experienced man to manage the Company. It will be headquartered in Wichita, Kans., will be well financed and has in hand sufficient business to produce immediate profits.

Starting salary $10,000 to $12,000 plus participation in profits. General administrative talent, knowledge of traffic methods and how to purchase advantageously from manufacturers are needed.

We have been appointed by the organizers to receive applications. Write fully to address below by Air Mail, including complete work history, education, family status and net worth. All information will be kept confidential. Those who are given consideration will be invited to Wichita, expenses paid, for final decision.

ASSOCIATED
PERSONNEL TECHNICIANS, INC.
Personnel Consultants
204 South Emporia
Wichita, Kansas

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

MANUFACTURER'S AGENT now traveling Texas to represent old line electric motors and controls for pumping oil. To contact oil field supply houses. Box G-975, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING REPRESENTATIVE

Major drilling company has opening around April 1 for contact and public relations man in Mid-Continent area, between ages of 30 and 40. Must be well acquainted with oil fraternity and have good personality. Drilling experience desirable. Must be able to furnish excellent references, past employment record, and educational background. Good position for right party. Box G-980, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. [illegible] Ph. No. 3-3141, Hobbs, New Mexico.

GRADUATE GEOLOGIST, 27, five years varied experience in geophysics, reservoir engineering, and well-sitting, desires geological connection with independent, small major, or consulting firm. Box G-978, The Oil and Gas Journal, Tulsa, Oklahoma.

ASPHALT REFINERY: Chemical engineer seeks position refinery operations to finished bituminous products and specialties as manager or supt.; latest research methods, product development. Box G-977, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: Twelve years experience in oil processing; laboratory, development, pilot plant operations, administration. Record shows progressive advancement. Now holding responsible position. Box G-973, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN: Presently employed Rocky Mountain area, 32, college graduate, 5 years major company experience all phases field and office land work. Desire change to smaller company or independent. Box G-974, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST — Foreign or domestic. Six years experience seismic interpretation United States and Canada. Engineering graduate, single. Extensive field and supervisory experience. Comprehensive knowledge of geophysics and geology. Familiar with large scale exploration planning. Competent seismologist. Present occupation senior interpreter with major oil company provides insufficient challenge. Desire similar or greater responsibility. Box G-982, The Oil and Gas Journal, Tulsa, Oklahoma.

Excellent opportunity for operator or group, seeking geologist to represent them in Central and West Texas. Thoroughly competent and experienced geologist available for headquarters in Abilene, Texas. Investigation and references excellent. Price's Oil Executive Personnel Agency, 239 White Building, Abilene, Texas.

GEOLOGIST-GEOPHYSICIST

29, 5 years major experience and graduate study—Pacific Coast, Gulf Coast, Mid-Continent & offshore; desires executive and/or staff exploration position, excellent references, location open, replies confidential.

Box G-983, The Oil and Gas Journal, Tulsa, Oklahoma

REFINERY PROCESS ENGINEER

Currently employed with major oil company operating in South America. Twelve years experience process control, design and economic studies large integrated refinery. B.S.-1941. Age 34. Desire return U.S.A. for permanent location. Box G-946, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

CHEMICAL ENGINEER, fifteen years' experience in the operation and design of Gasoline Plants, Refineries and Petro-Chemical Plants, specialized in the design and operation of high purity ethylene plants. Desires responsible position with a progressive Oil Company. Box G-791, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM SEISMOLOGIST: 5 years record work. Education in Physics and Geology. Box G-953, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN: Ten years experience all phases field and office functions land department production company. College and legal education. Relocate and travel. Box G-941, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 24, single, 2 years varied experience. Relocate Mid-Continent. Desire position with major or independent with chance for advancement. Box G-971, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT FOR SALE

FOR SALE: Approximately 7900′ of 3½″ OD Drill Pipe with 5″ OD Hughes Flash Weld Tool Joints. Practically new. Lawless Drilling Company, Inc., Odessa, Texas. Phone 6-5982.

5 X 8 Gardner-Denver mud Pump, Buda Power. Used 3 months. Cheap. Box G-981, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 20,000′ 1″ seamless pipe. New threads. New couplings. Better than new. While it lasts at 12c. M. J. Regan Pipe Co., Coffeyville, Kans.

FOR SALE: 4600 feet of 2⅛ EUE used tubing in extra good condition located in Sterling, Colorado. Phone 1348-W. E. W. Olson, 320 Denver Street, Sterling, Colorado.

FOR SALE: Mayhew 1000, Failing 2300′, Failing 1500′ capacity rigs complete. Box G-949, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: ENGINE—165 Hp. Climax T-61 on Skid. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

FOR SALE: Happy Coolers for 30, 50, and 80 H.P. Engines. Call Joe Huitt, Deep Rock Oil Corporation, Tulsa.

EVERYTHING in new and used equipment for well drilling. Fishing tools rented save money, get quotations from Pressey & Son, Pueblo, Colorado.

FOR SALE

9 WORTHINGTON VACUUM PUMPS, Feathervalve, single cylinder, 25″ dia. cylinder, 18″ stroke.

38 BUFFALO GEAR PUMPS, size 1½″ cap. 7½ G.P.M.

27 BUFFALO CO. TURBO FANS, type LL, size 3½″ bore, conoidal fans.

37 STORAGE TANKS, 7′ x 16′, 95 barrel, horizontal, ½″ welded tank steel.

9 VACUUM STILLS, 9′ x 30′ max. press 60-70 mm., hg. vacuum, max. temp 660° F., approx. wgt. 36,000 lbs.

12 STEEL BOXES, 8′ x 8′ x 30′, ¼″ steel plate

1 SURGE TANK, 10′ x 14′.

3 BAROMETRIC CONDENSERS

1 HORIZONTAL TANK, 4′ x 9

1 STEAM SEPARATOR.

1 VACUUM VAPOR CONDENSER.

Prices less than 25% of cost, condition mostly excellent. Located St. Louis District. Material recently dismantled from oil refinery. Many more items too numerous to classify. Write for complete list.

M. E. FITERMAN CO.
2031 Railway Exchange Bldg.
St. Louis, Missouri
Garfield 2677

THE PURDY COMPANY
8754 Dodson Ave.
Chicago, Illinois
Bayport 1-2100

EQUIPMENT FOR SALE

FOR SALE: At Oklahoma City 900′ 9″ OD 40# 8V Thd. Used seamless steel casing, $3.00 per ft., and 2500′ 9″ OD 46.10# used seamless steel casing, $3.60 per ft. Cities Service Oil. Patridge. Bartlesville, Oklahoma.

FOR SALE: Two 18-trace sets of Reflection Seismograph instruments, Rack and Panel mounted. One set mounted in instrument cab, on 1951 GMC Truck, model 301-24. Very reasonably priced. Texas Seismograph Co. Box 2069. Phone 3-1493. Wichita Falls, Texas.

TRUCK MOUNTED STEAMERS and pulling units, complete tools, now working. Box G-948, The Oil and Gas Journal, Tulsa, Oklahoma.

250,000 FT. 8⅝ o.d. pipe with collar and plain end. $1.00 per foot Oklahoma. Rogers & Lundquist, 620 Wright Building, Tulsa, Okla. Phone 3-2072—5-8850.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

40 ea. Cable Tool Stems—4″ to 5½″ O.D. 20 ea. 5½″ x 36″ Fishing Jars W/3¾″ Joints. 95 ea. Bailers—4¼″ to 10″ O.D.—25′ to 70′ Lengths. 84 Sand Pumps—Spang—Larkin—Miller—All Sizes. Well Servicing Units—All Sizes—Truck Mounted or Skid Units. R.L. Cardwell Double Drum Spudder—Excellent Condition. General Tool & Supply Co., Box 4387, Oklahoma City, Oklahoma.

FOR SALE: Model 300 Brewster Draw Works, powered with 2—GAK 125 Hp. Compounded. This equipment in drilling service in Cowley County, Kansas. Fortier & Wright Drilling Co., 600 Petroleum Bldg., Wichita, Kansas.

FOR SALE: At our Oklahoma City warehouse. 3150′ 10¾″ 19.42# new 7/32″ wall ARMCO Spiral Weld Line Pipe, plain end, beveled 30° in 50′ lengths. Price $1.85 per ft. Take entire quantity. Cities Service Oil. Patridge, Bartlesville, Oklahoma.

Gaso Duplex 4½″ x 6″ Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units, Westinghouse 20-25-50 KW Generating Units.

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AT-3427—Houston, Texas

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All sizes for pipe line and fuel gas requirements.

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MOTORS: 160 HP—440 volts—3 phase—60 cycle — 1160 rpm — 185 amps. — squirrel cage. Manufactured by Century. WELDING GENERATORS: 105 KW—Frame 97—70 volts—1500 amps.—compound wound—Century. In excellent condition.

BARGAIN PRICE! SUITABLE FOR TANK BUILDERS—SHIPYARDS—RAILROADS, ETC.

THE BOSTON METALS CO.
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BALTIMORE 2, MARYLAND
CURTIS 7-5050

EQUIPMENT FOR SALE

5 KW OIL FIELD Type light plant—purchased new—used 18 months. MERIDIAN DRILLING CO., INC. Telephone CE 2-2055, Oklahoma City, Oklahoma.

FAILING model heavy duty 1500 drill and water truck. Write to Box 819, Longmont, Colorado, for details.

EQUIPMENT WANTED

NOTICE: We buy. We sell equipment everywhere. If you want to sell or buy contact Pressey & Son, Pueblo, Colorado.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Greer Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WANTED: Either Walker-Neer, Model 310 or Bucyrus No. 48, with or without tools. Supply complete information first wire or air mail. Sioux Drilling Company, 503 Seventh Street, Rapid City, S. D.

WANTED: Used 5 x 8 horizontal, single action, Triplex power pump. Please state make and condition. Acid Engineers, Inc., Lakin, Kansas.

PRODUCTION WANTED

OIL PRODUCTION WANTED

Independent oil producer wishes to buy or operate on a royalty basis, primary oil production in Illinois, Indiana, Kentucky. Send full particulars and price.

Box G-972
The Oil and Gas Journal
Tulsa, Oklahoma

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LEASE AND DRILLING BLOCKS

FOR DEVELOPMENT. Approximately 11,000 acres of land under lease for drilling for gas and oil. Shallow wells drilled 50 years ago prove gas in this vicinity. If interested in developing any part of this write to B. H. Snyder, P. O. Box 166, Carlisle, Pa., for further information.

INDEPENDENT OPERATOR and producer to drill off-set well in Coleman County, Texas, in about 45 days; 3 possible pay zones; Jennings or Fry Sand and Gunsight Lime. Location on same fault line with several near-by producing fields. Excellent Geology. Will sell 1/32 Working Interest in well and 105 acre lease tract for $300.00. Petroleum Service Company, P. O. Box 1493, Fort Worth, Texas.

WANTED: Small blocks, oil, gas leases for secondary recovery. Box G-954, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Attractive surface structures in Overton County, Tenn. Seven sands above 1600 feet. Seven rigs drilling in adjoining county. N. M. Sauls, Geologist, Cookeville, Tenn.

CHEAP LEASES & ROYALTIES AVAILABLE: Due to other interests will sell my unproven acres to highest bidders. Wyoming—18,000 acres—leases. North Dakota—2,000 acres — leases. Colorado — 480 acres—leases. North Dakota—800 acres—minerals. Write for list. Box G-887, The Oil and Gas Journal, Tulsa, Oklahoma.

320 ACRE PRODUCING OIL LEASE, Kansas, recent well, 1000 acres offset leases, Hunton and Viola production. R. D. Swan, Daniel Building, Tulsa.

WANTED TO PURCHASE—Drilling Blocks near production. Texas preferred. Write fully. G. V. Arlen, 51 East 42nd Street, New York, New York.

FOR LEASE: 815 acres in Clay County, Illinois. Write Brownie or William E. Brooks, Louisville, Illinois.

KENTUCKY LEASES: Proven Production, small wells. Need capital to produce. 500 ft. Open for drilling contract. Large block. Phone 4, Lock Box 316, Greensburg, Kentucky.

FOR LEASE: S.W. 1/4-9-17-15 Barton County. $2.00 Bonus, $1.00 Rental per acre on 10 year lease. Louis Seidl, Otis, Kansas.

NEW MEXICO STATE LEASE, will sell 4,000 acre solid block semi-wildcat, good location. Box G-907, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

SEE A. L. BOWLES, Box 947, Ada, Okla., for attractive drilling deals and producing royalties.

FOR SALE: Oil lease, one sand well, drilled and cased. Adaptable to sand-fracturing. Cause, lack of finance. Will sell reasonable. Write or phone F. O. Kaub, Hamilton, Kansas.

MAJOR OIL STRUCTURE

SW. Wyoming parallel anticline west of large major wells producing in Frontier & Sundance sands. U. S. Gov't leases on structures offered. Complete data on request to oil men and investors.

W. J. PETERMAN, Geologist
Portales — 1918-1954 — New Mexico

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

FOR SALE OR LEASE

TWO TRAILER CAMPS: Each camp composed of seven trailers, utility truck, water truck and power plant truck. Each camp accommodates 28 men. United Geophysical Company, 1554 California Street, Denver, Colorado.

PIPELINE FINANCING

We engineer, install and finance gas gathering and pipeline systems, compression plants and natural gasoline plants.

In conjunction herewith we purchase casinghead and natural gas. Profit participations in plant and pipeline operations available.

Box G-895
The Oil and Gas Journal
Tulsa, Oklahoma

WILDCAT COMPLETIONS

(Continued from page 176)

Washington County, Bobcat: Continental Oil 1 Selby, NE NE SW 9-1s-56w. IPF 645 BOPD through 1-in. choke, "D" sand discovery (new field). TD 5,265 ft. "J" sand 5,183 ft.

Weld County: Tuley & Carter 1 Meyer, S1/2 SW SW 4-7n-58w. Dry. TD 6,579 ft. Skull Creek 6,542 ft.

MANITOBA

Cal-Standard 6-24 Harmsworth, LSD 6, 24-12-26w1. Dry. TD 3,160 ft.

J. P. Owen 3 Ellis, LSD 3, 10-3-22w1. Dry. TD 3,143 ft.

SASKATCHEWAN

Beverley Hills Petroleums 1, LSD 10, 32-55-26w3. Dry. TD 1,850 ft.

H. B.-Tide Water 6 Chaplin Lake, LSD 13, 3-20-7w3. Dry. TD 3,720 ft.

Wilrich-Trans Era 8 Maidstone, LSD 14, 11-50-23w3. Dry. TD 1,750 ft.

Socony-Woodley-Southern 4-9 South Fork, LSD 9, 4-7-21w3. Dry. TD 5,131 ft.

ALBERTA

Hudson's Bay-British American 1 Boundary, LSD 14, 10-99-11w6. Dry. TD 4,327 ft.

Shell A-13-16 Hayter, LSD 13, 16-40-1w4. Dry. 2,800 ft.

Gulf C. P. R. 12 Stevens, LSD 12, 25-44-1w5. Wet gas in D3 zone. TD 8,250 ft.

Husky-Greta 1 Joseph Lake, LSD 6, 25-51-23w4. Basal quartz gas well. TD 4,212 ft.

Pathfinder-Legion-Gas Ex.-Admiral 1 Bay Tree, LSD 6, 33-79-12w6. Cadotte gas well. TD 2,600 ft.

Royalite Fina 1 Saddle Hills, LSD 11, 4-76-8w6. Cadotte gas well. TD 6,285 ft.

Cities Service 1 Springdale, LSD 15, 11-45-2w5. Dry. TD 8,520 ft.

BRITISH COLUMBIA

Nig Creek 1—Unsurveyed territory. Triassic gas well. TD 11,999 ft. Plugged back 4,446 ft.

FAMOUS LAST WORDS:

Let's face it—they won't send out advance warning notices of atom-bomb attacks. They just sneak over and let go when we're least expecting it—without even so much as a declaration of war. The emergency may be an atom bomb or it may be a fire, a flood, a hurricane. It's only good business to be ready for it—whatever it is. Take these precautions TODAY:

- ☐ **Enlist the help** of your local Civil Defense Director.
- ☐ **Check contents** and locations of first-aid kits.
- ☐ **Send staff** to Red Cross courses. They may save your life.
- ☐ **Promote preparedness** in your community. Your local CD Director can show you how.

Set the standard of preparedness in your plant city—check off these four simple points NOW.

THE OIL AND GAS JOURNAL

TULSA 1, OKLAHOMA

Equipment Men

. . . In the News

Ebasco Services Names Two To Top Management Jobs

T. C. Wescott, president of Ebasco Services, Inc., has announced the appointment of W. H. McInnis as manager, and M. G. Kennedy as assistant manager of the company's sales, marketing, and public-relations department, which renders consulting services.

McInnis has had a long career in the electric and gas-utility industry, first joining the utility now known as Sierra Pacific Power Co. He was later with a number of other combination electric and gas-utility companies in various parts of the country as general sales manager. In 1931, he joined the Electric Bond & Share Co. system as general sales manager of Tennessee Public Service Co., and later as general sales manager of Memphis Power & Light Co., serving natural gas and electricity in the Memphis area. In 1939 he was appointed a sales and marketing consultant with Ebasco and for the past 4 years has been assistant manager of the sales, marketing, and public-relations department.

Kennedy began his utility career in the operating department of Pacific Power & Light Co. in 1930, later becoming assistant to the general sales manager and then sales promotion supervisor. In 1947, he became advertising manager of Kansas Power & Light Co. He later joined Pennsylvania Power & Light Co., and in 1950 became a sales and public-relations consultant with Ebasco.

Olson Named Assistant to Marlow Export Manager

In announcing the appointment of Richard H. Olson as his assistant, D. C. Broadwell, export manager of Marlow Pumps, Ridgewood, N. J., said, "Greatly increased export sales volume made the move necessary."

Olson will not take over any definite territory, but will aid dealers and distributors on a world-wide basis and relieve Broadwell of some of his field trips. Olson will travel to Mexico next month and will take a swing through Central and South America in the spring.

Prior to his association with Marlow, Olson was coowner of J. P. Harris Pump Co., a company engaged in sales and service of pumping equipment.

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LEGAL

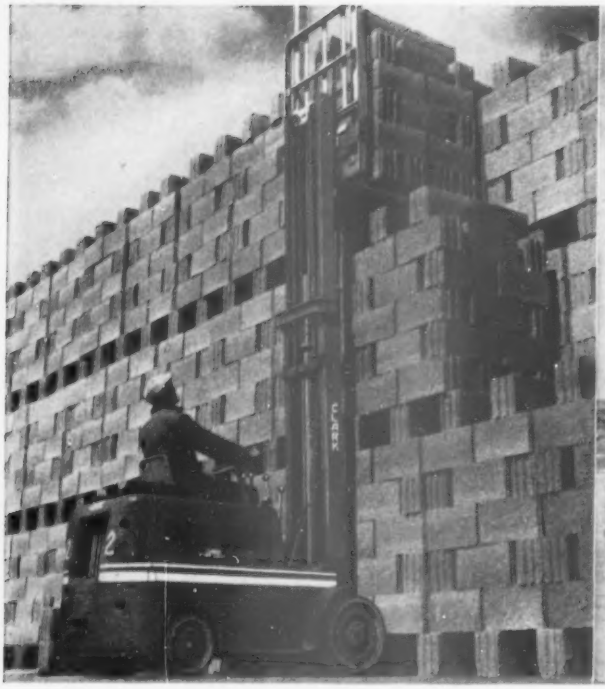
Sealed bids for oil and gas mining leases on 12,821.75 acres of trust lands on the Crow Indian Reservation Big Horn County, State of Montana, will be received at the Office of the Superintendent of Crow Indian Agency, Crow Agency, Montana, up to 2:00 o'Clock P.M. (MST) Friday, March 19, 1954. For further information, call or write L. C. Lippert, Superintendent, Crow Indian Agency, Crow Agency, Montana.

LEGAL

Sealed bids for Oil and Gas Mining Leases on restricted Tribal and Allotted lands of the Fort Berthold Indian Reservation, North Dakota, will be received at the Office of the Superintendent of the said reservation, New Town, North Dakota, until 2:00 P.M. Central Standard Time on March 16, 1954, and will be opened immediately thereafter in the presence of such bidders as may attend. There are 320 acres of Tribal lands and 26,795.675 acres of allotted lands for a grand total of 27,195.675 acres. All of this land is located in the county of Dunn, State of North Dakota. For additional information write the Superintendent of the Fort Berthold Agency, New Town, North Dakota, or call the Agency Land Office, Phone 654, New Town. Ralph M. Shane, Acting Superintendent.

LEGAL

1,280.28 acres of Allotted Indian lands, in 29 separate tracts, located on the Uintah and Ouray Indian Reservation, Townships 1 and 2 North, Ranges 1 East and 1 West, Uintah Special Base and Meridian Survey, Uintah County, State of Utah, are being advertised for oil and gas lease sale, bids on which will be opened 2:00 P.M., March 16, 1954, at the Uintah and Ouray Agency, Harry W. Gilmore, Superintendent, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.



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